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FIELD INVESTIGATION REPORT
FOR
PASCO SANITARY LANDFILL/
RESOURCE RECOVERY CORPORATION
PASCO, UASHINGTON

TDD NO.: F10-8701-04

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EPA

HAZARDOUS
SITE
EVALUATION
DIVISION

Field Investigation Team Zone II

CONTRACT NO.
68-01-7347

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ABSTRACT

Pursuant to U.S. Environmental Protection Agency (EPA) Technical Directive Document (TDD) F10-8701-04, Ecology and Environment, Inc. (E&E) conducted a ground water sampling program at the Pasco Sanitary Landfill/Resource Recovery Corporation Site near Pasco, Washington in March 1987.

Since 1973, several investigations of site conditions have been performed by Washington Department of Ecology and EPA personnel, and by consultants under contract to the site owners. In a 1986 effort by EPA, low-level organics contamination was detected in three domestic wells downgradient of the landfill. Additionally, chromium was detected in one off-site domestic well at a level which exceeded the federal drinking water standard.

The current investigation was initiated to confirm the direction of ground water flow beneath the site; to define the magnitude of on-site and off-site ground water contamination; and to determine the magnitude of total and hexavalent (dissolved fraction) chromium contamination in the Savage and Sons' domestic well.

To accomplish these objectives, a ground water elevation survey of all on-site ground water monitoring wells was performed and ground water samples were collected from thirteen on-site monitoring wells, one on-site water supply well, and from seven off-site domestic wells. All samples were analyzed for Target Compound List (TCL) organic and inorganic (total and dissolved) parameters. The Savage and Sons' well sample was also analyzed for total and hexavalent (dissolved fraction) chromium.

Measured ground water elevations verified that the ground water gradient is to the southwest. There is an apparent drawdown of the water table in the vicinity of the on-site water supply well, probably due to a localized demand.

Volatile organics were detected in two on-site monitoring wells and in one domestic well. Semi-volatile organics were detected in only one on-site monitoring well.

The concentration of total chromium detected in the Savage and Sons' domestic well was an order of magnitude lower than the Federal Drinking Water Standard. Hexavalent chromium was not detected. Other inorganics concentrations in ground water and drinking water were highly variable, and did not show a distribution consistent with the ground water flow. Total inorganics analyses were not significantly different from dissolved inorganic analyses.

1.0 INTRODUCTION

Pursuant to U.S. Environmental Protection Agency (EPA) Contract Number 68-01-7347, Technical Directive Document (TDD) Number F10-8701-04, and the Field Operations Work Plan dated March 1987, Ecology and Environment, Inc. (E&E) conducted a ground water sampling program at the Pasco Sanitary Landfill/Resource Recovery Corporation Site near Pasco, Washington, in March 1987. This document summarizes the objectives and scope of the investigation, discusses sampling techniques utilized, and presents hydrogeologic and analytical results of the investigation.

Since 1973, several investigations of site conditions have been performed by Washington Department of Ecology and EPA personnel (1, 2, 3), and by consultants (in particular, JUB Engineers of Kennewick, Washington) under contract to the site owners (4, 5). In studies conducted by E&E in 1985, the concentrations of inorganics in ground water samples from on-site monitoring wells were found to be, in general, orders of magnitude greater than those in samples collected previously (3). Additional sampling, conducted by EPA in 1986, indicated the source of these discrepancies was related to heavy siltation in many of the wells, and the use of different sample collection techniques in the various investigations (6). EPA's 1986 sampling also indicated low-level organics contamination of three domestic wells downgradient of the landfill, a condition potentially but not necessarily related to the site.

As a result of past problems with inorganic data and the recent indication of downgradient contaminant migration, EPA tasked E&E to further evaluate on- and off-site ground water quality at the Pasco Sanitary Landfill. A total of 13 on-site monitoring wells, one on-site water supply well, and seven off-site water supply wells were sampled during the investigation for EPA Target Compound List (TCL) organic and inorganic parameters. A single sampling method was employed to ensure consistency in sample collection.

1.1 Objectives

The objectives of the Pasco Sanitary Landfill sampling program were to:

- o confirm the direction of ground water flow beneath the site;
- o further define the magnitude of on-site and downgradient ground water contamination of selected wells by TCL organic and inorganic parameters; and
- o determine the magnitude of total and hexavalent (dissolved fraction) chromium contamination in the Savage & Sons' domestic well.

1.2 Scope

To accomplish these objectives, the following tasks were performed:

- o collected ground water elevation data from sampled monitoring wells;

- collected ground water samples from eight on-site monitoring wells installed by E&E in 1985 (EE1 through EE5), and from five on-site wells installed by J-U-B Engineers (JUB) in 1982 (JUB1 through JUB4, and JUB Control Well);

- collected drinking water samples from one on-site water supply well, and from seven water supply wells approximately one mile downgradient of the site;

- analyzed all samples for TCL volatile and semi-volatile compounds, polychlorinated biphenyls (PCBs), pesticides, and inorganic elements (total and dissolved fraction); and

- analyzed the Savage & Sons' domestic well for total and hexavalent chromium (dissolved fraction).

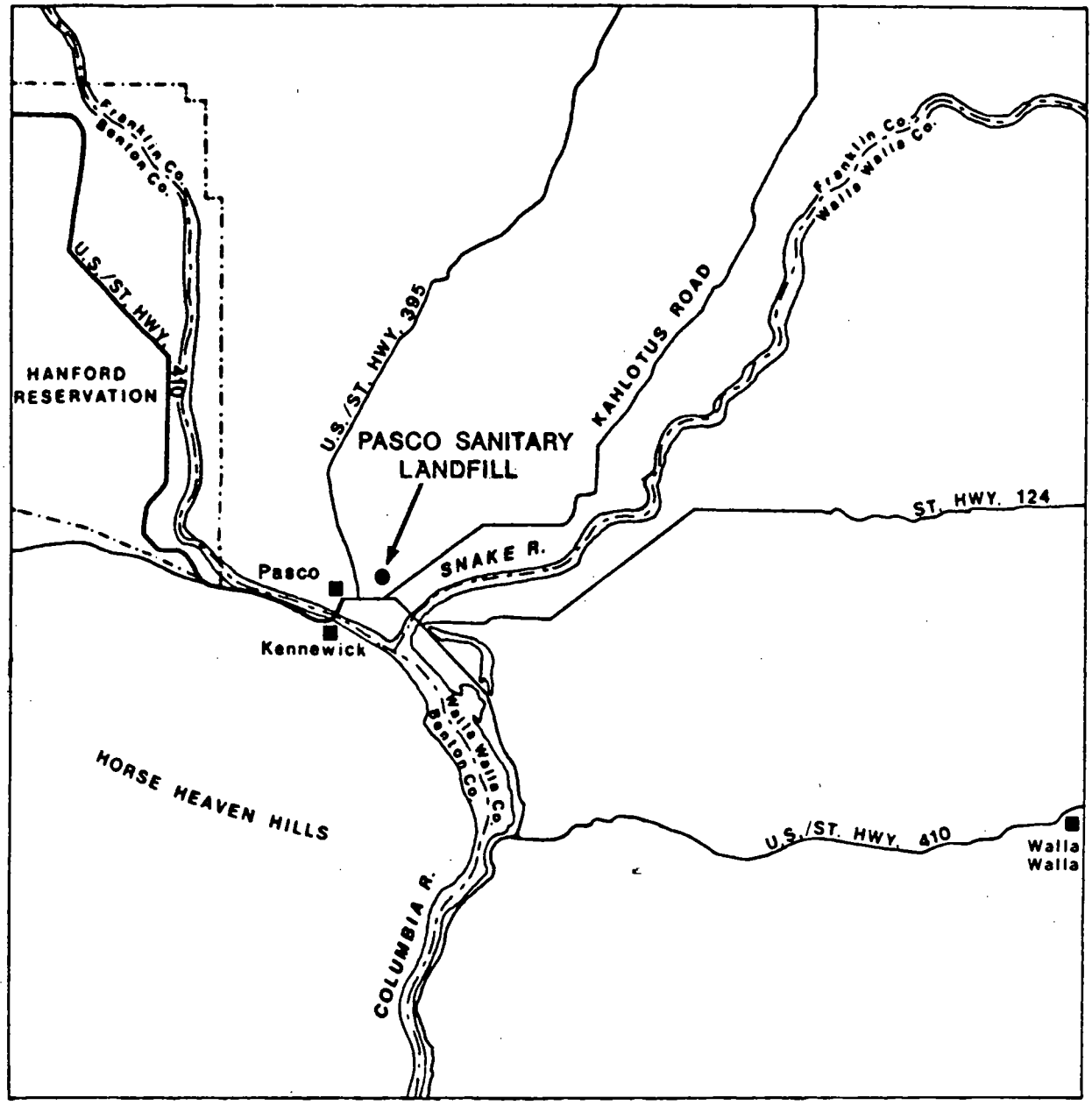
2.0 SITE LOCATION AND HISTORY

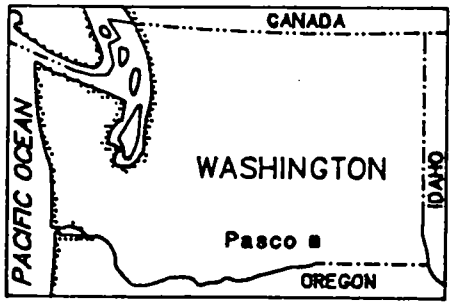
The Pasco Sanitary Landfill is located 1.5 miles northeast of Pasco, Washington, in the Southwest 1/4 of Section 15 and the Northwest 1/4 of Section 22, Township 9 North, Range 30 East, Willamette Meridian, Franklin County, Washington (Figures 1 and 2). The site lies in an area dominated by irrigated agricultural fields and rangeland, at an average elevation of approximately 410 feet above mean sea level (3).

Pasco Sanitary Landfill, originally known as the Basin Disposal Company Dump Site, was owned and operated by John Dietrich as an open municipal waste burning dump from 1956 to 1971. In 1971, all burning was halted and the site was converted into a sanitary landfill. In 1974, the landfill began accepting large quantities of septic wastes for open pit disposal (3).

Resource Recovery Corporation (RRC) was formed by a partnership between Basin Disposal Company and Chemical Processors, Inc., of Seattle, Washington (Larry Dietrich, Waste Site Operator/Manager). RRC leased a portion of Pasco Sanitary Landfill in 1972 and began operations as a regional hazardous waste disposal site under Washington Department of Ecology Permit No. 5301, issued March 21, 1973. RRC accepted potentially hazardous wastes from various sources between early 1972 and December 1974, and operated the site until January 1981 (3). In 1981 the operation lease terminated, and all interests RRC had in the operation reverted to the Dietrichs. The sanitary landfill operation, which continued throughout the period that the RRC lease was active, has been under the direction of Larry Dietrich since 1981 (3).

A number of investigations have been conducted at the site since 1973 to evaluate potential environmental problems associated with hazardous waste disposal (1, 2, 3, 4, 5, 6). A summary of the major activities and significant conclusions are presented in Table 1. Of primary importance to the current study are the results of EPA's sampling efforts in 1986. During that study, low-levels of organic compounds were tentatively identified in drinking water wells downgradient of the site. As a precaution, EPA determined it was necessary to resample the drinking water wells to ensure that the levels did not increase. At this time, there is no abso-





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Job: F10-8701-04	Waste Site: WA0280
Drawn by: B.T.	Date: 4/22/1987

FIGURE 1
LOCATION MAP
PASCO SANITARY LANDFILL
Pasco, WA

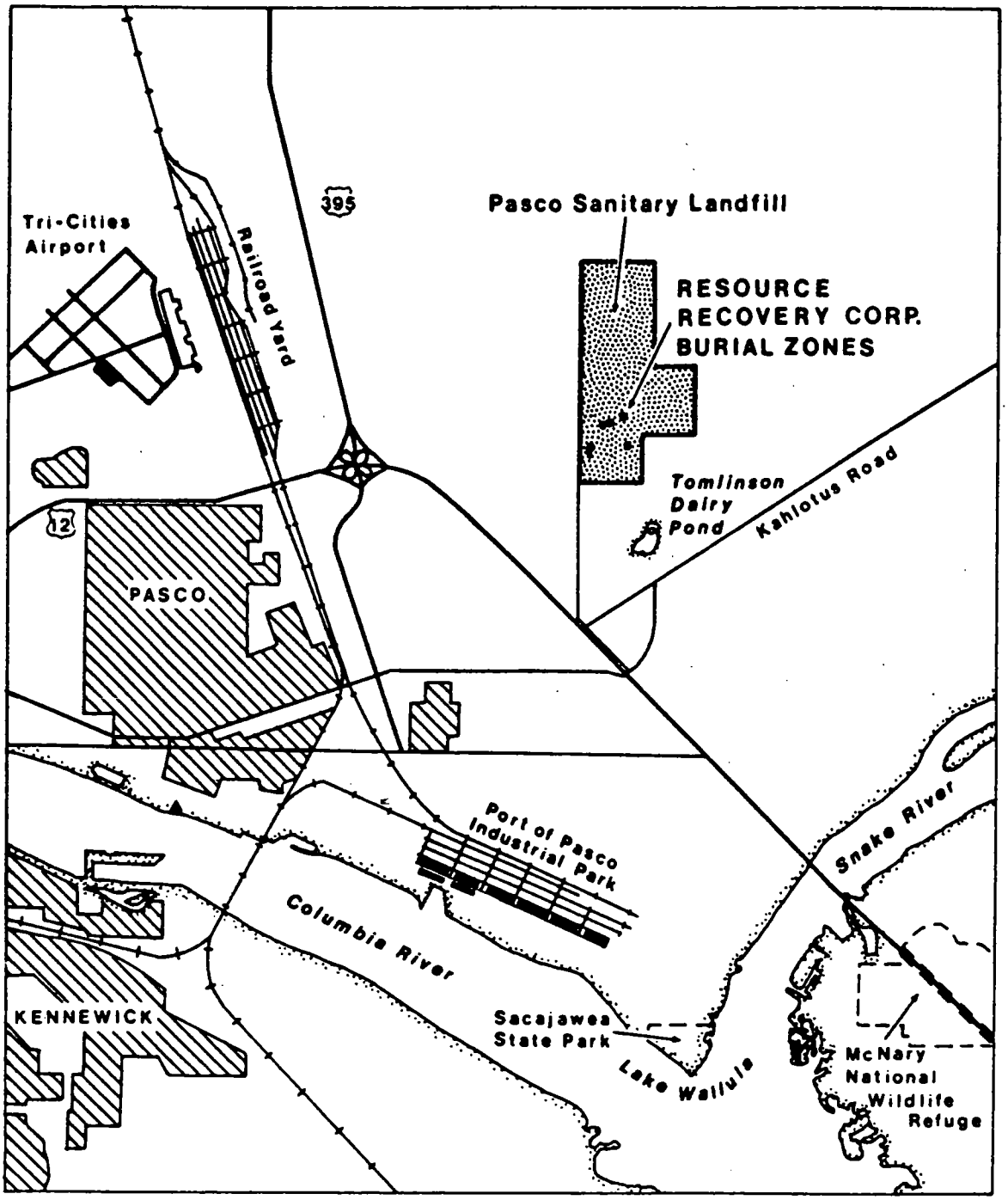

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FIGURE 2
VICINITY MAP
PASCO SANITARY LANDFILL
Pasco, WA

TABLE 1

SUMMARY OF ENVIRONMENTAL INVESTIGATIONS[1]
PASCO SANITARY LANDFILL, PASCO, WASHINGTON

Year	Investigator	Major Activities	Conclusions
1973	WA Dept. of Ecology	o Site visit and Interviews o File reviews	o Location appropriate for disposal of Industrial solid wastes o Liquid waste disposal inappropriate due to shallow water table o Permit Issued for landfill to accept potentially hazardous wastes; permit life 1973-1974
1982 - 1983	J-U-B Engineers	o Six monitoring wells Installed under a subcontract from PSL/RRC o Quarterly sampling for TCL inorganics and cyanide	o Analytical results below EPA allowable contaminant levels o Quarterly monitoring to continue under Ecology order
1984	E&E/EPA	o Site visit and interviews o Three ground water samples collected; analyzed for TCL organic and inorganic compounds	o No evidence of organic contamination in on-site monitoring wells o Upgradient (control) well exhibited higher levels of inorganics than downgradient wells o General increase in contaminant levels over previous sampling results
1985	E&E/EPA	o Nine additional on-site wells installed including one hew control well o Ground water and soil samples collected	o Evidence of on-site ground water contamination by organic compounds o Significant increases of inorganic levels over previous sampling o Potential off-site migration
1986	EPA	o Eight drinking water wells sampled (1 mile downgradient) o Three on-site monitoring wells sampled o One irrigation well sampled (about 1/4 mile downgradient)	o Low level organics detected in several monitoring, drinking water, and the irrigation well; all levels below drinking water standards o Anomalous inorganic data in on-site monitoring wells attributed to siltation in wells and use of different sampling techniques between various investigations o More data needed to Identify sources of contaminants; resampling planned to ensure levels In drinking water wells remain safe
1987	EPA	o On-site ground water elevation survey o Thirteen on-site monitoring wells sampled o Seven off-site and the on-site drinking water wells sampled	o Volatile organics detected in two on-site monitoring wells o Volatile organics detected in one drinking water well, but levels below drinking water standards

(1) - Complete references follow Field Operations Report
EPA = Environmental Protection Agency
PSL = Pasco Sanitary Landfill
RRC = Resource Recovery Corporation
TCL = Target Compound List
ESE = Ecology and Environment, Inc.

lute evidence that the source of chemicals detected in the drinking water wells is the Pasco Sanitary Landfill. In addition, it was concluded that anomalous inorganic concentrations detected in previous studies were the result of siltation problems in many of the on-site wells and a function of sampling methods (6).

3.0 SAMPLING PROGRAM

3.1 Sample Types, Quantities, and Analytical Requirements

Ground water samples were collected from 13 of 14 on-site monitoring wells and one on-site water supply well (Figure 3), and from seven off-site domestic wells (Figure 4). No sample was obtained from on-site monitoring well EE9 due to large amounts of sand and silt in the purge water. All samples were analyzed through the EPA Contract Laboratory Program (CLP) for TCL organic and inorganic parameters, except cyanide (Appendix A). Inorganic analyses were performed for both total and dissolved metals. The samples that were intended for dissolved metals were filtered and analyzed at the EPA Region X Laboratory in Manchester, Washington. In addition, the Savage and Sons' domestic well was analyzed for total and hexavalent chromium (dissolved fraction) at the EPA Region X Laboratory.

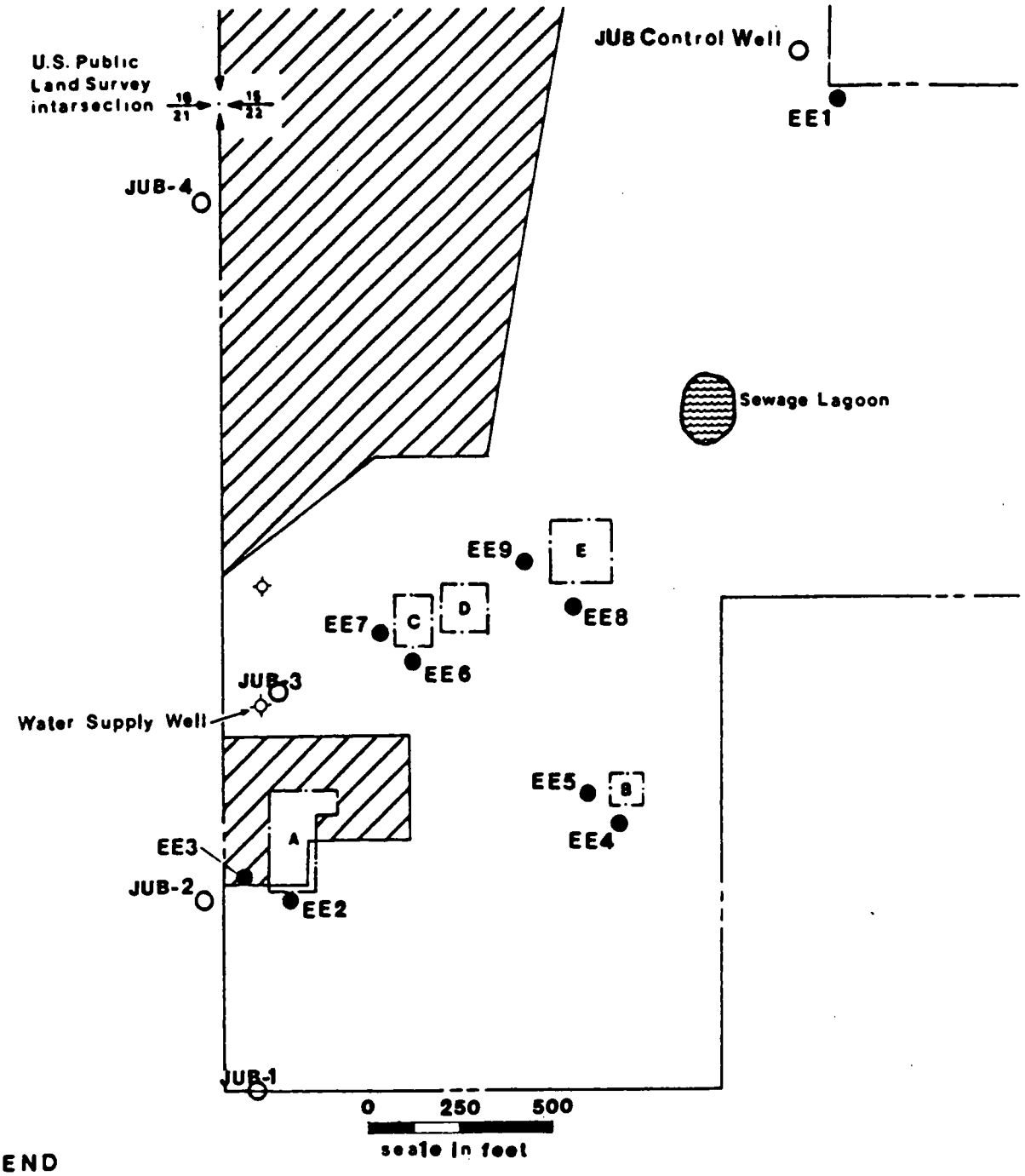
Quality assurance samples included transport blanks, duplicates, and rinsate samples. Two transport blanks were prepared to check for bottle contamination and/or potential problems during sample shipments. Two duplicate analyses were completed to evaluate the consistency of the sampling technique and assess laboratory performance. Rinsate samples were collected two times from the well purging pump to evaluate the adequacy of the equipment decontamination process. A single rinsate sample was also collected from the pump transport cylinder to further evaluate the decontamination process. Table 2 summarizes the sampling program.

3.2 Sampling Methods

Ten of the on-site monitoring wells were sampled using a portable bladder pump supplied by JUB Engineers. The bladder pump was chosen over conventional bailing methods to minimize disturbance and the resulting agitation of the silt and/or sand within the screened zone. It was believed that the use of this method would likely reduce the amount of suspended solids in the collected ground water sample.

Samples obtained with the portable pump were collected following a six step process:

- wells were opened and ambient breathing level air and head space above the standing water were monitored with an H-Nu PI101 (10.2eV lamp);
- static water level measurements were obtained, and static volumes calculated;
- the portable bladder pump was decontaminated and installed in the well;



LEGEND

- Municipal waste disposal zones
- [C] Location and name of Resource Recovery burial zone
- ---- Boundary of Pasco Sanitary Landfill
- JUB-4 ○ Location and number of JUB monitoring well
- EE9 ● Location and number of Ecology and Environment monitoring well

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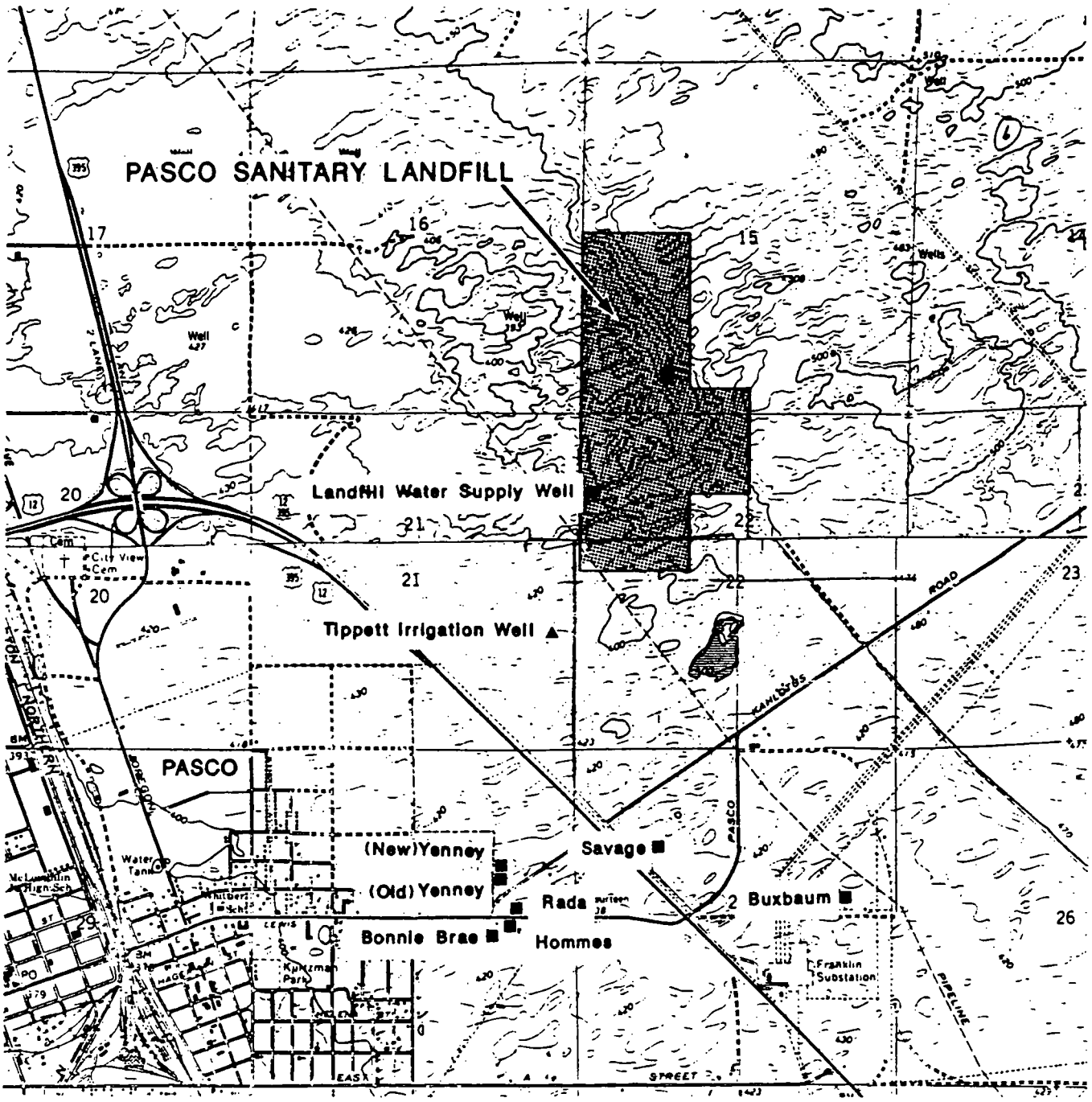
Drawn by: B.T.	Date: 4/22/1987

FIGURE 3
MONITORING WELL LOCATION MAP
PASCO SANITARY LANDFILL
Pasco, WA



LEGEND

Rada ■ Location and name of domestic well

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Drawn by: B.T.	Date: 4/24/1987

FIGURE 4
DOMESTIC AND IRRIGATION WELL LOCATION MAP
PASCO SANITARY LANDFILL
Pasco, WA

TABLE 2

SAMPLE TYPES, NUMBERS, AND ANALYTICAL REQUIREMENTS
PASCO SANITARY LANDFILL, PASCO, UASHINGTON
MARCH 11, 1987

Matrix	Number of Samples	Number of Quality Assurance Samples		Total	Sample Type	Analytical Requirements
		Transport	Rinsate			
Ground Water	21[1]	4	3[2]	28	Grab (Unfiltered)	TCL (Minus CN^-)
	21[1]	4	3[2]	28	Grab (Filtered)	Selected TCL Inorganics (Minus CN^-)
	1	0	0	1	Grab (Filtered)	Total Cr, Cr^{6+}

1 Included eight on-site wells installed by E&E and five installed by JUB, one on-site water supply well, and seven off-site water supply wells.

2 Included two random rinsate samples following decontamination of the purging pump (see Section 3.2), and one rinsate sample following decontamination of the pump-carrying tube.

- o the bladder pump was installed and three static volumes were purged into 55-gallon DOT-approved drums;
- o purge water was monitored for pH, temperature, and conductivity at 10 minute intervals; and
- o samples were obtained directly from the discharge port of the pump line. Samples for volatile organic analyses were collected first, followed by samples for semi-volatiles, pesticides, and PCBs, and finally, samples for total and dissolved metals.

Samples from EE2, EE3, and JUB2 were collected following a similar sequence, with the exception of the pump decontamination/installation steps.

Prior to initial sampling, and in the event of massive potential contamination of the portable pump (i.e., excessive sand/silt and/or human contact), the outside of the portable pump was decontaminated using a consecutive series of each of the following washes/rinses:

- o alconox wash;
- o clean water rinse;
- o acetone rinse;
- o methanol rinse; and
- o carbon-free water rinse.

Between wells, the portable pump was decontaminated as follows:

- o after removal from the well, the pump was placed inside a PVC transport cylinder;
- o the pump was allowed to pump dry; hosing and pump were purged with at least two gallons of clean tap water obtained from the on-site water supply well, followed by one gallon of carbon-free water;
- o following decontamination, the pump was transported in the PVC cylinder to minimize handling by field personnel; and
- o the hosing was rinsed with carbon-free water and placed inside a 4-mil plastic bag.

To further reduce the potential for cross-contamination between wells, samples were obtained sequentially from the least contaminated wells (control wells) to the most contaminated wells, based on previous monitoring data. The wells were sampled in the following order: EE1 (control well), JUB control well, EE4, EES, EE6, EE7, EES, EE9, JUB4, JUB3, JUB1, EE3, JUB2, and EE2.

The domestic wells samples were collected at either the household faucet or outdoor faucet without purging to reflect water quality at the point of use. The Bonnie Brae, Hommes, Rada, and Savage domestic well samples were collected from the household faucet, while samples from the Old Yenney, New Yenney, Buxbaum and on-site water supply well were collected from outdoor faucets. In all cases, samples for volatile organics analyses were collected first, followed by samples for semi-volatiles, pesticides, and PCBs, and finally, samples for total and dissolved metals.

Prior to commencing sampling activities at the site, the Sample Control Officer of the Region X EPA Environmental Services Division (ESD) designated the laboratories where collected samples were to be shipped. The E&E project manager notified the designated contract laboratory through the Sample Control Office of ESD of the confirmed days on which sampling was to occur, and consequently, when samples were to be shipped. The project manager also confirmed the sample documentation numbers, the number of samples to be shipped and the type of analyses required, and verified their arrival at the designated laboratory through the Sample Control Officer.

The potential evidentiary nature of the data collected during the investigation requires that the possession of samples be traceable from the time they were collected until they are introduced as evidence during enforcement proceedings. Consequently, all sample documentation and Chain-of-Custody procedures were as specified in the National Enforcement Investigations Center policy and procedures guidelines (7).

Filled sample bottles were capped and sealed with EPA custody tape. All sample bottles were placed inside two 4-mil plastic bags. These protective bags were then placed inside the sample shipping containers (i.e., ice chest). Vermiculite and/or bubble pack was used to fill up the empty space in the ice chest, and to act as a shock absorbent during shipping.

Samples were accompanied by appropriate Region X Field Sample Data Sheets, Chain-of-Custody forms, and/or CLP Traffic Report Forms. These forms were placed in a ziplock bag and taped to the inside of the ice chest.

The ice chest containing the samples and the documentation was then sealed with fiberglass strapping tape. Chain-of-Custody seals were placed across the front and back of the lid of all shipping containers after the containers had been filled. Packaging conformed to the requirements of the National Enforcement Investigation Center (8). Samples were shipped to the designated laboratory by overnight carrier within 24 hours of collection.

Investigation-derived wastes generated during the project included purge water, decontamination solution, and disposable clothing. A total of nine drums of purge water and one drum of decontamination solution were generated. Each drum was labelled with an E&E label which detailed the following information: site name, date of collection, source of waste material (i.e., EE1, JUB1), and type of waste material. The drums were stored on site in a designated location with the owner's permission. Disposable equipment (protective clothing, miscellaneous refuse, etc.) was double-bagged and disposed of in the Pasco Sanitary Landfill with the owner's permission.

4.0 SAMPLING RESULTS AND DISCUSSION

Results of the sampling program are presented below. Sample documentation records are summarized in Appendix B and copies of Quality Assurance Memoranda pertaining to CLP data generated by the investigation are provided in Appendix C.

4.1 Water Level Survey

Construction details for the on-site monitoring wells and static water levels measured between March 17 and 19, 1987, are summarized in Table 3. JUB Engineers installed dedicated bladder pumps in wells EE2, EE3, and JUB2 on March 13, 1987. In order to install the pumps, JUB Engineers cut the upper terminus of each well casing to accommodate the pumps. JUB calculated new casing elevations for EE2, EE3, and JUB2 based on the length of casing removed to accommodate pump installation and on the length of casing added by the dedicated pump cap. As a result, the originally surveyed casing elevations for each have been adjusted accordingly in Table 3. Information used to calculate the adjustments was provided by JUB Engineers (9). The error associated with this adjustment is considered insignificant to the study, being at least one order of magnitude less than the apparent hydraulic gradient.

TABLE 3

MONITORING WELL CHARACTERISTICS AND STATIC WATER LEVELS
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987

	EE1 (control well)	EE2	EE3	EE4	EE5	EE6	EE7	EE8	EE9	JUB (control well)	JUB1	JUB2	JUB3	JUB4
Total Depth (ft.)[1]	88	88	87	72	75	102	100	100	97	70	90	82	93.3	60
Casing Type	2" SS	2" SS	2" SS	2" SS	2" SS	2" SS	2" SS	2" SS	2" SS	2" PVC	2" PVC	2" PVC	2" PVC	2" PVC
Screen Depth Interval (ft.)[1]	66-68	64-86	65-87	48-70	50-72	77.5-99.5	78-100	78-100	75-97	50-54 66-69	71-75 87-90	62-66 78-81	70-74 86-89	40-43 55-57
Casing Elevation (ft. AMSL)	*	418.9[2]	416.8[2]	397.6[1]	407.9[1]	427.0[1]	425.6[1]	428.4[1]	426.2[1]	411.6[2]	417.1[1]	408.3[1]	420.4[1]	393.7[1]
Static Water Depth	55.9	66.2	64.5	44.5	53.1	71.3	70.4	72.8	72.0	50.3	67.5	58.3	71.7	38.9
Ground Water Elevation (ft. AMSL)	*	352.7	352.3	353.1	354.8	355.7	355.2	355.6	354.2	361.3	349.6	350.0	348.7	354.8

SS - Stainless steel
PVC - Polyvinylchloride
* No data available

(1) Source: Final Report for Resource Recovery Corporation, Pasco, Washington, TDD R10-8410-14, Ecology and Environment, Inc., 1986.
(2) Source: JUB Engineers

TABLE 12

SUMMARY OF TOTAL INORGANIC ANALYTICAL RESULTS FOR
GROUND UATER MONITORING UELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, UASHINGTON
MARCH 1987
(ug/l)

Analyte	EE1 (control well)	EE2	EE3	EE4	EE5	EE6	EE7	EE8	JUB (control well)	JUB1	JUB2	JUB3	JUB4
Aluminum	69.0	31.0U	31.0U	31.0	44.0	35.0	41.0	34.0	156.0	36.0	31.0U	31.0U	31.0U
Barium	71.0	70.0	138.0 J	70.0	61.0	70.0	65.0	74.0	62.0	60.0 J	73.0 J	70.0 J	71.0 J
Beryllium	0.3UJ	0.5U	0.2UJ	0.3UJ	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.3UJ	0.2	0.3UJ	0.3UJ
Calcium	56900.0	65070.0	93710.0	5S660.0	57380.0	57340.0	57070.0	57030.0	56260.0	55000.0	58470.0	54770.0	61830.0
Chromium	11.0	6.0	6.0	9.0	9.0	13.0	8.0	8.0	8.0	8.0	6.0	6.0	8.0
Cobalt	6.SU	6.8U	6.8U	6.8U	6.SU	6.SU	6.8U	7.0	6.8U	6.8U	8.0	6.8U	8.0
Iron	340.0 JF	173.0	11030.0 JF	I50.0 J	131.0 J	315.0 JF	123.0 J	156.0 J	510.0JF	103.0	20.0 J	22.0 J	40.0 J
Magnesium	21910.0	21070.0	22990.0	21040.0	21790.0	21940.0	21700.0	21810.0	21870.0	20670.0	21370.0	20950.0	20990.0
Manganese	4.0	2.0	1144.0 F	2.0	2.0	2.0	1.0	2.0	7.0	4.0	1.0	1.0	4.0
Potassium	6688.0	8005.0	8649.0	7807.0	6737.0	6635.0	6667.0	6766.0	6391.0	7253.0	7408.0	6711.0	7122.0
Sodium	33960.0	33270.0	30920.0	34830.0	34630.0	34S70.0	34850.0	34750.0	34310.0	35070.0	35650.0	35140.0	34260.0
Vanadium	24.3	21.2	3.7	25.0	23.3	23.0	21.3	22.6	21.5	22.5	20.5	19.4	21.5

U - The material was analyzed for, bu[illegible]as not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is [illegible] estimated quantity because quality control criteria were not met or the reported value Is less than the contract required detection limit (CRDL).

F - The concentration of this element [illegible]ceeds the Secondary Drinking Water Standard listed in the current National Secondary Drinking Water Rules and Regulations.

TABLE 12

SUMMARY OF TOTAL INORGANIC ANALYTICAL RESULTS FOR
GROUND UATER MONITORING UELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, UASHINGTON
MARCH 1987
(ug/l)

Analyte	EE1 (control well)	EE2	EE3	EE4	EE5	EE6	EE7	EE8	JUB (control well)	JUB1	JUB2	JUB3	JUB4
Aluminum	69.0	31.0U	31.0U	31.0	44.0	35.0	41.0	34.0	156.0	36.0	31.0U	31.0U	31.0U
Barium	71.0	70.0	138.0 J	70.0	61.0	70.0	65.0	74.0	62.0	60.0 J	73.0 J	70.0 J	71.0 J
Beryllium	0.5UJ	0.5U	0.2UJ	0.5UJ	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.5UJ	0.2	0.5UJ	0.5UJ
Calcium	56900.0	65070.0	93710.0	58660.0	57380.0	57340.0	57070.0	57030.0	56260.0	55000.0	58470.0	54770.0	61830.0
Chromium	11.0	6.0	6.0	9.0	9.0	13.0	8.0	8.0	8.0	8.0	6.0	6.0	8.0
Cobalt	6.8U	6.8U	6.5U	6.8U	6.8U	6.5U	6.8U	7.0	6.8U	6.8U	8.0	6.8U	8.0
Iron	340.0 JF	173.0	11030.0 JF	150.0 J	131.0 J	315.0 JF	123.0 J	156.0 J	510.0JF	103.0	20.0 J	22.0 J	40.0 J
Magnesium	21910.0	21070.0	22990.0	21040.0	21790.0	21940.0	21700.0	21810.0	21870.0	20670.0	21370.0	20950.0	20990.0
Manganese	4.0	2.0	1144.0 F	2.0	2.0	2.0	1.0	2.0	7.0	4.0	1.0	1.0	4.0
Potassium	6688.0	8005.0	8649.0	7807.0	6757.0	6635.0	6667.0	6766.0	6391.0	7253.0	7408.0	6711.0	7122.0
Sodium	33960.0	33270.0	30920.0	34830.0	34650.0	34870.0	34850.0	34750.0	34310.0	35070.0	35650.0	35140.0	34260.0
Vanadium	24.3	21.2	3.7	25.0	23.5	23.0	21.3	22.6	21.5	22.5	20.5	19.4	21.5

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value Is less than the contract required detection limit (CRDL).

F - The concentration of this element exceeds the Secondary Drinking Water Standard listed in the current National Secondary Drinking Water Rules and Regulations.

TABLE 12

SUMMARY OF TOTAL INORGANIC ANALYTICAL RESULTS FOR
GROUND UATER MONITORING UELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, UASHINGTON
MARCH 1987
(ug/1)

Analyte	EE1 (control well)	EE2	EE5	EE4	EE5	EE6	EE7	EES	JUB (control well)	JUB1	JUB2	JUBS	JUB4
Aluminum	69.0	31.0U	31.0U	31.0	44.0	35.0	41.0	34.0	156.0	36.0	31.0U	31.0U	31.0U
Barium	71.0	70.0	138.0 J	70.0	61.0	70.0	65.0	74.0	62.0	60.0 J	73.0 J	70.0 J	71.0 J
Beryllium	0.5UJ	0.5U	0.2UJ	0.5UJ	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.SUJ	0.2	0.3UJ	0.SUJ
Calcium	56900.0	65070.0	93710.0	5S660.0	57380.0	57340.0	57070.0	570S0.0	56260.0	55000.0	58470.0	54770.0	61830.0
Chromium	11.0	6.0	6.0	9.0	9.0	13.0	8.0	S.0	8.0	8.0	6.0	6.0	8.0
Cobalt	6.8U	6.8U	6.8U	6.8U	6.8U	6.8U	6.8U	7.0	6.8U	6.8U	8.0	6.8U	8.0
Iron	340.0 JF	173.0	11030.0 JF	I50.0 J	131.0 J	315.0 JF	123.0 J	156.0 J	510.0JF	103.0	20.0 J	22.0 J	40.0 J
Magnesium	21910.0	21070.0	22990.0	21040.0	21790.0	21940.0	21700.0	21810.0	21870.0	20670.0	21370.0	20950.0	20990.0
Manganese	4.0	2.0	1144.0 F	2.0	2.0	2.0	1.0	2.0	7.0	4.0	1.0	1.0	4.0
Potassium	6688.0	8005.0	8649.0	7807.0	6737.0	6635.0	6667.0	6766.0	6391.0	7253.0	7408.0	6711.0	7122.0
Sodium	33960.0	33270.0	30920.0	34830.0	34630.0	34870.0	34850.0	34750.0	34310.0	35070.0	35650.0	35140.0	34260.0
Vanadium	24.3	21.2	3.7	25.0	23.3	23.0	21.3	22.6	21.5	22.5	20.5	19.4	21.5

U - The material was analyzed for, bu[illegible]as not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is [illegible] estimated quantity because quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

F - The concentration of this element [illegible]ceeds the Secondary Drinking Water Standard listed In the current National Secondary Drinking Water Rules and Regulations.

At the JUB control well, the upper casing terminus was cut by JUB Engineers to provide easier access to the well during sampling activities. The well was subsequently resurveyed by JUB. The newly surveyed elevation is reflected in Table 3.

During the pump installation procedure, approximately five gallons of water were pumped from each of the three wells (9). The purge water was discharged to the ground. Additionally, on March 13, 1987, JUB utilized an airlift pump to purge approximately 30 gallons of water from all the JUB wells. The purging was undertaken to ascertain solids accumulation in the wells. Significant amounts of sand were found only in JUB control well.

Water level measurements collected during the study are depicted graphically in Figure 5. The data indicate a general ground water flow direction of to the southwest, with an approximate gradient of 3.7 feet per 1,000 feet. Similar flow directions and gradients were observed in December of 1982 by JUB (Figure 6), and in July of 1985 by E&E (Figure 7).

The water level of well EE9 in Figure 5 is inconsistent with the general hydraulic gradient measured during the study. In that well, EE9 was found to contain excessive sand and silt during purging operations, the measured water level was considered unreliable and was not used in assessing flow patterns beneath the site. Accumulated silt in the screened zone may effect the accuracy of water level measurements.

Distortions in the water table in the vicinity of well JUB3 and the on-site water supply well are indicative of a localized stress on the hydrogeologic system. Similar, but less pronounced distortions are apparent in the 1982 and 1985 water table maps (Figures 6 and 7). JUB suggested in their 1983 report that demands on the on-site water supply well were the cause of the distortion in 1982. Two residences, located approximately 500 feet south of JUB3, use water from the water supply well.

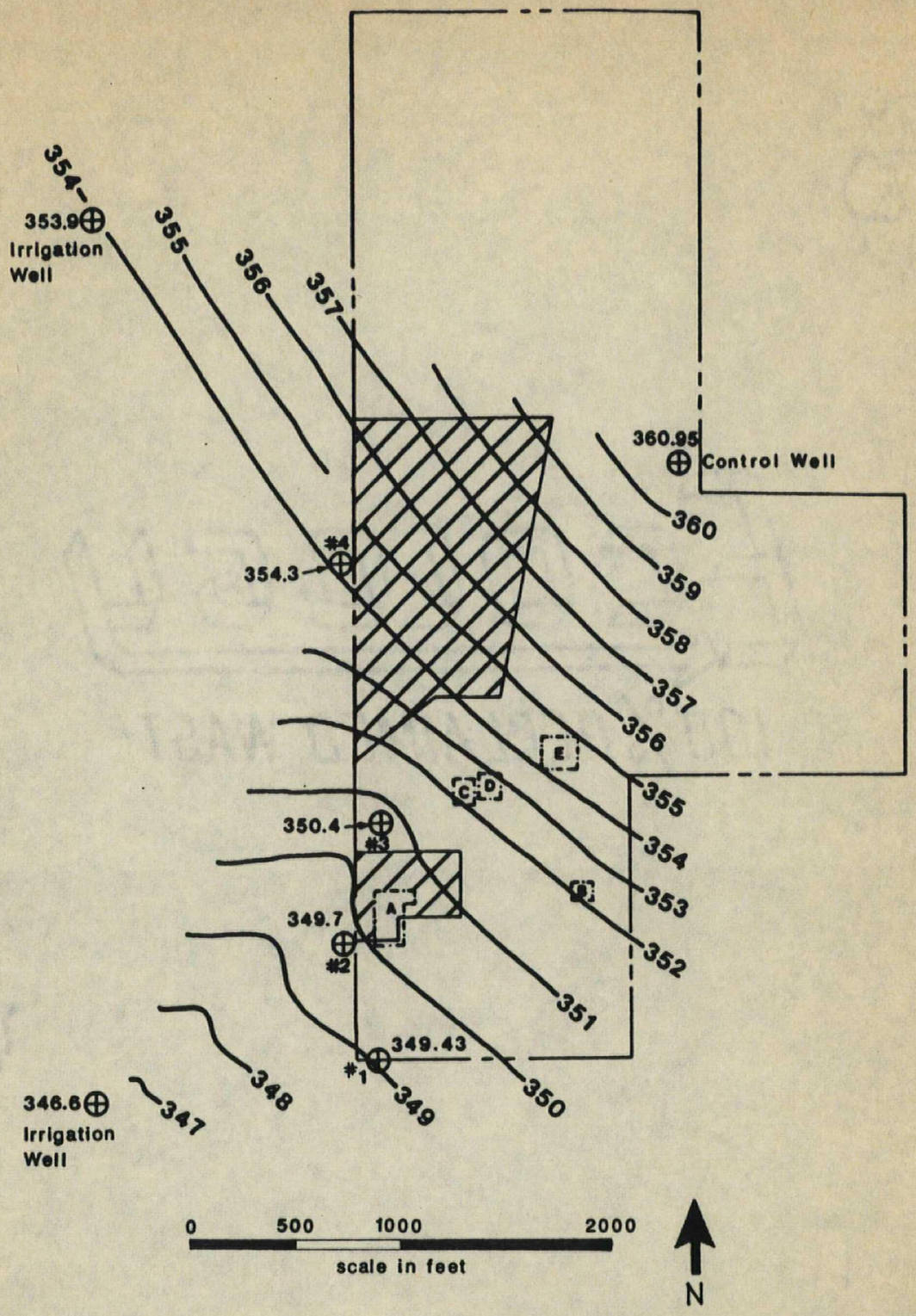
The relatively greater distortion of the 1987 water level measurements (Figure 5) suggests a relative greater demand on the system than in earlier years. The month prior to the 1987 water-level study, a construction project immediately south of the residences began withdrawing significant volumes of water from the supply well (10). Water may also have been withdrawn from an irrigation well, located 50 feet due east of the water supply well. The construction project reportedly used large volumes of water throughout the study period. EPA requested water usage estimates from the landfill owner through a letter. To date, this information has not been provided.

4.2 Air Monitoring

Ambient breathing level air and head space gas above standing water in monitoring wells were monitored with an H-Nu PI101 (10.2eV lamp) for organic vapors. Head space readings above background were measured immediately after the wells were uncapped, with the exception of JUB 3 which was loosely capped. Within one to two minutes, headspace readings returned to zero. No readings above background were recorded in ambient breathing level air during the sampling period.

These pages replace 4 pages of the Pasco report - with those changes - its final.

Yoni C.



LEGEND

- Municipal waste disposal zones
- [C] Location and name of Resource Recovery burial zone
- ---- Boundary of Pasco Sanitary Landfill
- -351- Contour showing ground water elevation, in feet AMSL
- 346.6 Elevation of ground water at monitoring well, in feet AMSL
- #4 ⊕ Location and number of existing JUB monitoring well

ecology & environment, inc.	
Job: F10-8701-04	Waste Site: WA0280
Drawn by: B.T.	Date: 6/26/1987

FIGURE 6
WATER TABLE ELEVATION CONTOUR MAP, AS MEASURED BY JUB ENGINEERS, DECEMBER 1982 (5)
PASCO SANITARY LANDFILL
Pasco, WA

4.4.3 Pesticide/PCB Analyses

No TCL pesticides or PCBs were detected in ground water monitoring well or drinking water well samples collected March 1987.

4.4.4 Tentatively-Identified Compounds (TIC)

Tentatively-Identified Compounds (TICs) are the tentative identification of non-TCL organic compounds which provide information on potential organic contaminants outside the analytical parameters outlined in Appendix A. TIC analyses for ground water monitoring wells and drinking water wells are listed in Tables 10 and 11, respectively. Well EE3 had the greatest number of TICs of the ground water monitoring well samples. As in 1985, substituted benzene compounds are prevalent and may be components of coal tar, gasoline, or paint wastes.

Four TICs were detected in domestic well samples Bonnie Brae, Buxbaum, and New Yenney wells.

4.4.5 Inorganic Analyses

4.4.5.1 Total Inorganic Analyses

Tables 12 and 13 list total inorganic analytical results for monitoring well samples and drinking water samples, respectively, taken in March 1987. Concentrations of total inorganics appear to be randomly distributed among the ground water samples. Concentrations flagged "F" reflect that the level exceeds the Secondary Drinking Water Standard listed in the current National Secondary Drinking Water Rules and Regulations. Secondary Drinking Water Standards are established for taste, odor, and other parameters of general aesthetic quality.

No definitive trends indicative of a contaminant plume are apparent in the inorganic data. Similarly, total inorganic concentrations in the drinking water samples do not exhibit an obvious distribution consistent with the observed ground water gradient. One possible explanation is that this is due to the heterogeneity of the aquifer in question. The inconsistency in the results is comparable to that determined by E&E in the 1985 investigation, where similar concentration variations were found in adjacent ground water monitoring wells throughout the site (3).

4.4.5.2 Dissolved Inorganic Analyses

Dissolved inorganic analyses for monitoring well and drinking water well samples are tabulated in Tables 14 and 15, respectively. As with total inorganic concentrations, dissolved inorganics concentrations were randomly distributed in all samples collected from both on-site and off-site wells.

Little difference was observed when concentrations of total inorganics were compared to concentrations of dissolved inorganics for those elements common to both analyses (Tables 12 and 13 versus Tables 14 and 15). This implies that siltation in the samples was not a problem in this sampling effort.

At the JUB control well, the upper casing terminus was cut by JUB Engineers to provide easier access to the well during sampling activities. The well was subsequently resurveyed by JUB. The newly surveyed elevation is reflected in Table 3.

During the pump installation procedure, approximately five gallons of water were pumped from each of the three wells (9). The purge water was discharged to the ground. Additionally, on March 13, 1987, JUB utilized an airlift pump to purge approximately 30 gallons of water from all the JUB wells. The purging was undertaken to ascertain solids accumulation in the wells. Significant amounts of sand were found only in JUB control well.

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The relatively greater distortion of the 1987 water level measurements (Figure 5) suggests a relative greater demand on the system than in earlier years. The month prior to the 1987 water-level study, a construction project immediately south of the residences began withdrawing significant volumes of water from the supply well (10). Water may also have been withdrawn from an irrigation well, located 50 feet due east of the water supply well. The construction project reportedly used large volumes of water throughout the study period. EPA requested water usage estimates from the landfill owner through a letter. To date, this information has not been provided.

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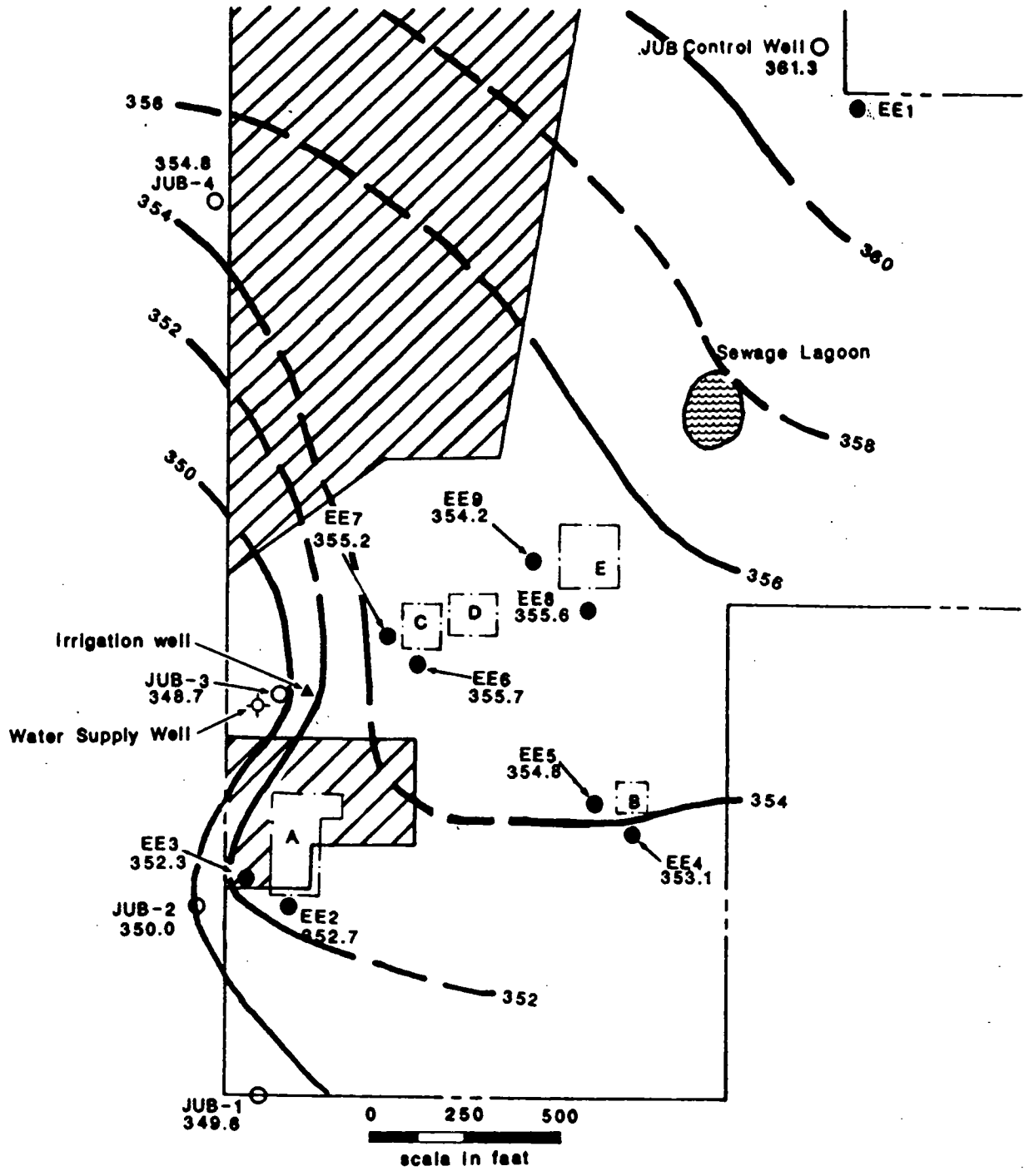

LEGEND

- Municipal waste disposal zone
- C — Location and name of Resource Recovery burial zone
- Boundary of Pasco Sanitary Landfill
- JUB-4 — Location and number of existing monitoring well
- EE9 — Location and number of Ecology and Environment monitoring well
- 365.2 — Elevation of water table at monitoring well, in feet AMSL
- -350- — Contour showing water table elevation, in feet AMSL (dashed where inferred)

N

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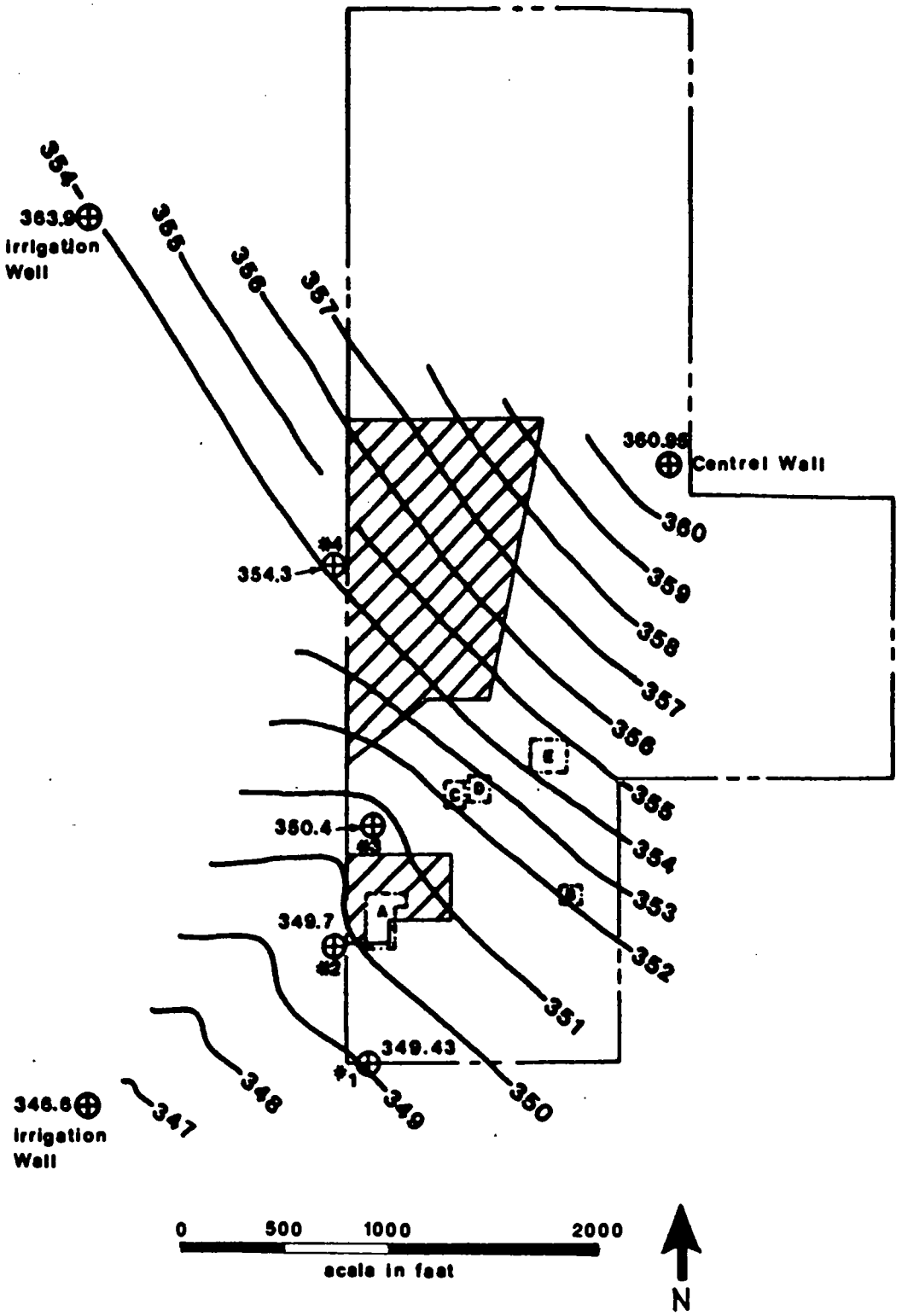
Drawn by: B.T.	Date: 4/29/1987

FIGURE 5

WATER TABLE ELEVATION CONTOUR MAP, AS MEASURED BY E&E, MARCH 1987

PASCO SANITARY LANDFILL

Pasco, WA



LEGEND

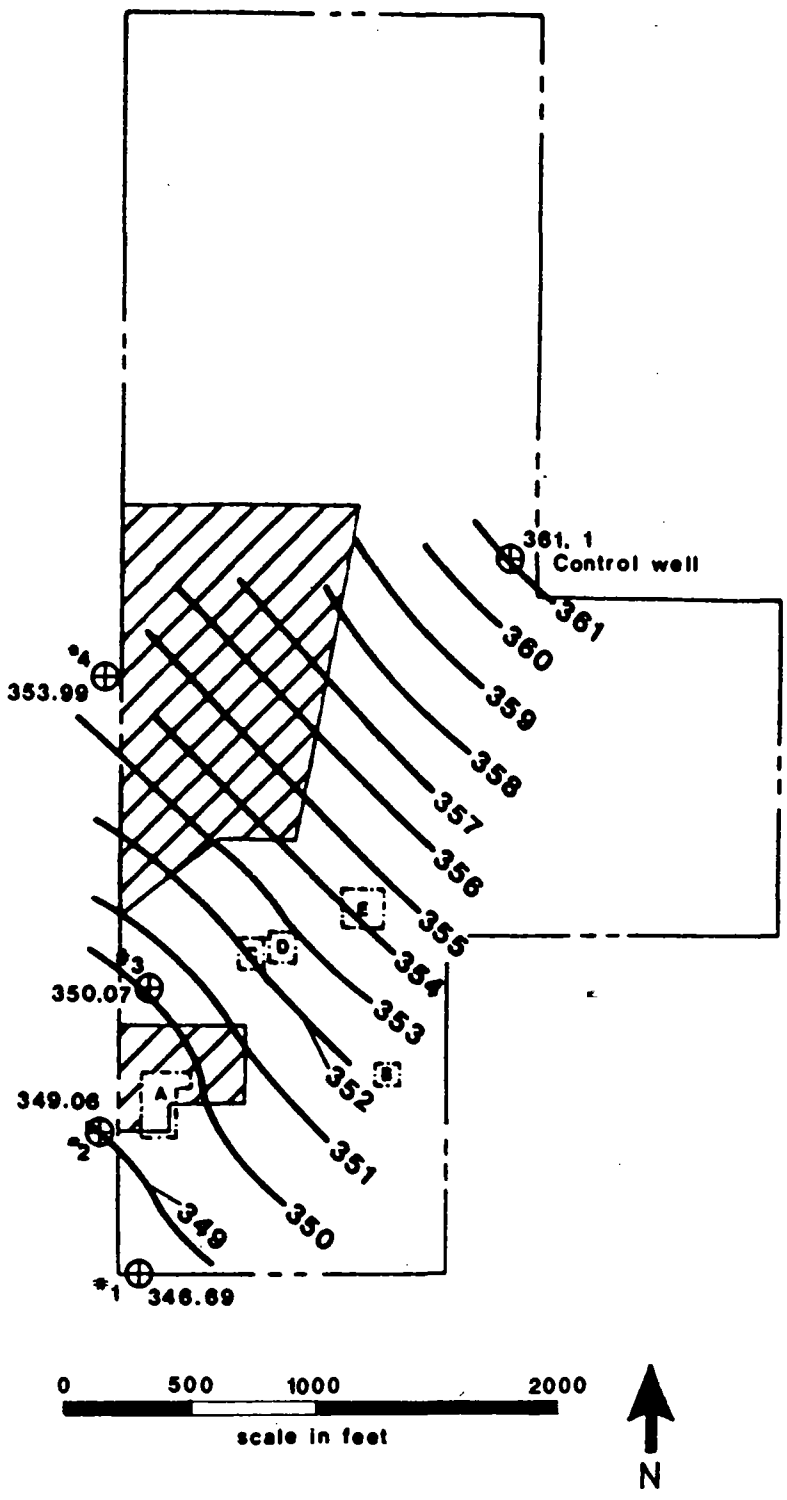
- Municipal waste disposal cones
- [C] Location and name of Resource Recovery burial zone
- ---- Boundary of Pasco Sanitary Landfill
- -351- Contour showing ground water elevation, in feet AMSL
- 346.6 Elevation of ground water at monitoring well, in feet AMSL
- #4 Location and number of existing JUB monitoring well

ecology & environment, inc.	
Job: F10-8701-04	Waste Site: WA0280
Drawn by: B.T.	Date: 6/26/1987

FIGURE 6

WATER TABLE ELEVATION CONTOUR MAP, AS MEASURED BY JUB ENGINEERS, DECEMBER 1982 (5)

PASCO SANITARY LANDFILL
Pasco, WA



LEGEND

- Municipal waste disposal zones
- [C] Location and name of Resource Recovery burial zone
- ---- Boundary of Pasco Sanitary Landfill
- -351- Contour showing ground water elevation, in feet AMSL
- 349.06 Elevation of ground water at monitoring well, in feet AMSL
- ⊕ #4 Location and number of existing JUB monitoring well

ecology & environment, inc.	
Job: FID-8701-04	Waste Site: WA0280
Drawn by B.T.	Date: 6/26/1987

FIGURE 7

WATER TABLE ELEVATION CONTOUR MAP, JULY 1985 (3)

PASCO SANITARY LANDFILL

Pasco, WA

4.3 Field Measurements

A summary of ground water measurements of temperature, pH, and specific conductivity taken from on-site monitoring wells between March 17 and 19, 1987, is presented in Table 4. The values presented reflect end of purge conditions. Temperature values ranged from 14.2°C in JUB2 to 16.4°C in EE7. PH readings varied from 7.0 (EE3, EE9, and JUB3) to 7.9 (JUB1). Conductivity readings ranged from 400 umhos/cm in JUB3 to 650 umhos/cm in EE1 and JUB Control Well.

4.4 Analytical Results for Ground Water

4.4.1 Volatile Organic Analyses

In the March 1987 study, volatile organics (VOAs) were detected in ground water samples from on-site monitoring wells EE3 and JUB2 (Table 5). Monitoring well EE3 was placed downgradient of an area reportedly used for disposal of paint wastes, pesticides residues, wood treatment wastes, used etchings solutions, metal castings wastes, and laboratory wastes. The area was also used for open burning and municipal waste disposal (3). JUB2 lies approximately 100 feet downgradient of EE3. The compounds detected have numerous uses as solvents and degreasers, and are constituents of paint and varnish intermediates, paint removers, and dry cleaning fluids.

Table 6 provides a comparison of detected VOAs between the 1985 and 1987 investigations. Concentrations of VOAs have decreased in EE2, while they have increased significantly in EE3. Additionally, concentrations of two compounds (1,1,1-trichloroethane and trichloroethane) have decreased in JUB2 from 1985 to 1987. These observations suggest that pumpage of the water supply well and the irrigation well may be altering the direction of ground water flow in a more westerly direction, and thus may also be impacting the movement of contaminants in ground water.

Analyses of samples taken in March 1987 from the Bonnie Brae drinking water well indicated the presence of 1,1 dichlorethane (2.1J ug/l) and tetrachloroethene (2.6J ug/l) (Table 7). The concentrations of both are estimates in that they were detected at levels below the contract-required detection limit. Comparable results were obtained in the October 1986 EPA investigation (Table 8). The reported concentration of tetrachloroethylene does not exceed available drinking water guidelines (10 ug/l, World Health Organization guideline). No standard is available for 1,1 -dichloroethane. No volatile organic compounds were detected in the other drinking water wells sampled.

4.4.2 Semi-volatile Organic Analyses

Table 9 lists semi-volatile organic analytical results for the on-site monitoring wells sampled in March 1987. Qualified identifications were made for four analytes in the EE3 sample. All other analyses were below quantitation limits.

Semi-volatile organic analyses for drinking water samples revealed only one compound, phenol (9.1J ug/l), in the Savage well. No other semi-volatiles were detected in any of the samples, taken in March 1987.

TABLE 4

SUMMARY OF FIELD MEASUREMENTS TAKEN
(END OF PURGE)
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH, 1987

Well	Temperature °C	pH	Conductivity (umhos/cm)
EE1 (control well)	15.5	7.5	650
EE2	15.4	7.6	440
EE3	16.0	7.0	610
EE4	16.0	7.5	435
EE5	14.7	7.5	420
EE6	15.9	7.5	480
EE7	16.4	7.5	470
EE8	15.8	7.5	420
EE9	15.3	7.0	450
JUB (control well)	15.8	7.5	650
JUB1	15.1	7.9	410
JUB2	15.6	7.6	420
JUB3	14.2	7.0	400
JUB4	14.5	7.6	410

TABLE 5

SUMMARY OF VOLATILE ORGANIC ANALYTICAL RESULTS FOR
GROUND WATER MONITORING WELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Analyte	EE1 (control well)	EE2	EE3	EE4	EE5	EE6	EE7	EE8	JUB (control well)	JUB1	JUB2	JUB3	JUB4
1,1-Dichloroethylene	5.0U	5.0U	110.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.7	5.0U	5.0U
1,1-Dichloroethane	5.0U	5.0U	410.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	29.0	5.0U	5.0U
Trans-1,2-Dichloroethene	5.0U	5.0U	210.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	15.0	5.0U	5.0U
Chloroform	5.0U	5.0U	54.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	13.0	5.0U	5.0U
1,1,1-Trichloroethane	5.0U	5.0U	1500.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	69.0	5.0U	5.0U
Trichloroethene	5.0U	5.0U	1900.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	110.0	5.0U	5.0U
Benzene	5.0U	5.0U	32.0 J	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U
4-Methyl-2-Pentanone	10.0U	10.0U	1600.0	10.0U	10.0U	10.0U	10.0U	10.0U	10.0U	10.0U	10.0U	10.0U	10.0U
Tetrachloroethene	5.0U	5.0U	72.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	2.9 J	5.0U	5.0U
Toluene	5.0U	5.0U	1600.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U
Ethyl Benzene	5.0U	5.0U	160.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U
Total Xylenes	5.0U	5.0U	600.0	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U	5.0U

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value Is less than the contract required detection limit (CRDL).

B - The tentatively identified compound was found in the laboratory's analytical method blank.

TABLE 6

SUMMARY OF VOLATILE ORGANIC ANALYTICAL RESULTS FOR
GROUND WATER MONITORING WELL SAMPLES VS. TIME
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
(ug/l)

Analyte	EE2		EE3		JUB 2	
	July/Aug 1985 (1)	March 1987	July/Aug 1985 (1)	March 1987	July/Aug 1985 (1)	March 1987
1,1-Dichloroethene	5.0	5.0U	50.0U	110.0	13.0	5.7
1,1-Dichloroethane	15.0	5.0U	64.0	410.0	35.0	29.0
Trans-1,2-Dichloroethene	9.0	5.0U	50.0U	210.0	15.0	15.0
Chloroform	3.0	5.0U	50.0U	54.0	17.0	13.0
1,1,1-Trichloroethane	70.0	5.0U	420.0	1500.0	168.0	89.0
Trichloroethene	65.0	5.0U	480.0	1900.0	164.0	110.0
Benzene	5.0U	5.0U	50.0U	32.0 J	5.0U	5.0 U
4-Methyl-2-Pentanone	10.0U	10.0U	100.0U	1600.0	10.0U	10.0 U
Tetrachloroethene	32.0	5.0U	5.0U	72.0	5.0U	2.9 J
Toluene	5.0U	5.0U	230.0	1600.0	5.0U	5.0 U
Ethyl Benzene	5.0U	5.0U	50.0U	160.0	5.0U	5.0 U
Total Xylenes	5.0U	5.0U	63.0	600.0	5.0U	5.0 U

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

B - The tentatively identified compound was found in the laboratory's analytical method blank.

(1) Source: Final Report for Resource Recovery Corporation, Pasco, Washington. TDD R10-8410-14, Ecology and Environment, Inc., 1986.

TABLE 7

SUMMARY OF VOLATILE ORGANIC ANALYTICAL RESULTS FOR
DRINKING WATER WELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Analyte	Water Supply Well (On-site)	Bonnie Brae	Buxbaum	Hommes	New Yenney	Old Yenney	Rada	Savage
1,1-Dichloroethane	5.0 U	2.1 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5.0 U	2.6 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

B - The tentatively identified compound was found in the laboratory's analytical method blank.

TABLE 8

SUMMARY OF VOLATILE ORGANIC ANALYTICAL RESULTS FOR
DRINKING WATER UELL SAMPLES VS. TIME
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
(ug/l)

Analyte	Bonnie Brae		New Yenney		Old Yenney	
	1986[1]	1987	1986[1]	1987	1986[1]	1987
1,1-Dichloroethane	5.0 U	2.1 J	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	2.0 J	2.6 J	5.0 U	5.0 U	5.0 U	5.0 U
1,1,1-Trichloroethane	5.0 U	5.0 U	5.0 U	5.0 U	3.0 J	5.0 U
Trichloroethene	5.0 U	5.0 U	1.0 M	5.0 U	3.0 J	5.0 U

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is an estimated quantity because cause quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

M - Mass spectral criteria for positive identification were not met. However, in the opinion of the laboratory, the identification is correct based on the analyst's professional judgment.

(1) Source: QA Memorandum of Case 6507 (Organics), Pasco Sanitary Landfill/Resource Recovery, Ecology and Environment, Inc., Dec. 10, 1986.

TABLE 9

SUMMARY OF SEMI-VOLATILE ANALYTICAL RESULTS FOR
GROUND WATER MONITORING WELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Analyte	EE1 (control well)	EE2	EE3	EE4	EE5	EE6	EE7	EE8	JUB (control well)	JUB1	JUB2	JUB3	JUB4
1,2-Dichlorobenzene	10.0U	10.0U	3.5 J	10.0U	10.0U	10.0U	10.0UJ	10.0U	10.0U	10.0U	10.0U	10.0UJ	10.0U
2-Methylphenol	10.0U	10.0U	4.9 JM	10.0U	10.0U	10.0U	10.0UJ	10.0U	10.0U	10.0U	10.0U	10.0UJ	10.0U
Isophorone	10.0U	10.0U	4.3 JM	10.0U	10.0U	10.0U	10.0UJ	10.0U	10.0U	10.0U	10.0U	10.0UJ	10.0U
Naphthalene	10.0U	10.0U	1.7 JM	10.0U	10.0U	10.0U	10.0UJ	10.0U	10.0U	10.0U	10.0U	10.0UJ	10.0U

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

M - Mass spectral criteria for positive identification were not met. However, in the opinion of the laboratory, the identification is correct based on the analyst's professional judgement.

4.4.3 Pesticide/PCB Analyses

No TCL pesticides or PCBs were detected in ground water monitoring well or drinking water well samples collected March 1987.

4.4.4 Tentatively-identified Compounds (TiC)

Tentatively-identified Compounds (TiCs) are the tentative identification of non-TCL organic compounds which provide information on potential organic contaminants outside the analytical parameters outlined in Appendix A. TiC analyses for ground water monitoring wells and drinking water wells are listed in Tables 10 and 11, respectively. Well EE3 had the greatest number of TiCs of the ground water monitoring well samples. As in 1985, substituted benzene compounds are prevalent and may be components of coal tar, gasoline, or paint wastes.

Four TiCs were detected in domestic well samples Bonnie Brae, Buxbaum, and New Yenney wells.

4.4.5 inorganic Analyses

4.4.5.1 Total inorganic Analyses

Tables 12 and 13 list total inorganic analytical results for monitoring well samples and drinking water samples, respectively, taken in March 1987. Concentrations of total inorganics appear to be randomly distributed among the ground water samples. Concentrations flagged "F" reflect that the level exceeds the Secondary Drinking Water Standard listed in the current National Secondary Drinking Water Rules and Regulations. Secondary Drinking Water Standards are established for taste, odor, and other parameters of general aesthetic quality.

No definitive trends indicative of a contaminant plume are apparent in the inorganic data. Similarly, total inorganic concentrations in the drinking water samples do not exhibit an obvious distribution consistent with the observed ground water gradient. One possible explanation is that this is due to the heterogeneity of the aquifer in question. The inconsistency in the results is comparable to that determined by E&E in the 1985 investigation, where similar concentration variations were found in adjacent ground water monitoring wells throughout the site (3).

4.4.5.2 Dissolved inorganic Analyses

Dissolved inorganic analyses for monitoring well and drinking water well samples are tabulated in Tables 14 and 15, respectively. As with total inorganic concentrations, dissolved inorganics concentrations were randomly distributed in all samples collected from both on-site and off-site wells.

Little difference was observed when concentrations of total inorganics were compared to concentrations of dissolved inorganics for those elements common to both analyses (Tables 12 and 13 versus Tables 14 and 15). This implies that siltation in the samples was not a problem in this sampling effort.

TABLE 10

SUMMARY OF TENTATIVELY IDENTIFIED COMPOUND RESULTS FOR
GROUND WATER MONITORING WELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Compound	Scan#	EE3	EE6	EE8	JUB2
Methane, dichlorofluoro	125	11 J			
Ethane,1,1,2-trichloro-1,2, 2-trifluoro	260-262	65 J			8 J
Unidentified	290		8 J	6 J	
Unknown hydrocarbon	318	5 J			
Benzene, dimethyl	333	84 J			
Unidentified	359	3 J			
Unidentified	365	17 J			
Benzene, (1-methylethyl)	379	4 J			
Benzene, propyl	418	8 J			
Benzene, ethyl-methyl-	428	38 J			
Benzene, trimethyl	436	15 J			
Benzene, trimethyl	465	23 J			
Benzene, trimethyl	498	7 J			
Cyclohexanone,3,3,5-trimethyl-	515	23 J			
Unidentified	529	3 J			
Unidentified	536	6 J			
2-Cyclohexen-1-one, 3,5,5-trimethyl	596	11 J			
Unidentified	610	6 J			
Unknown halogenated organic	868			10 J	

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

Scan# - Similar to retention time.

TABLE 11

SUMMARY OF TENTATIVELY IDENTIFIED COMPOUND RESULTS FOR
DRINKING WATER WELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Compound	Scan#	Bonnie Brae	Buxbaum	New Yenney
Unidentified	289		30 J	
Unidentified	290	4 J		10 J
1-propene,trichloro	415	15 J	20 JB	10 JB
Unidentified	1701		15 J	

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

B - The tentatively identified compound was found in the laboratory's analytical method blank.

Scan# - Similar to retention time.

TABLE 12

SUMMARY OF TOTAL INORGANIC ANALYTICAL RESULTS FOR
GROUND UATER MONITORING UELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, UASHINGTON
MARCH 1987
(ug/l)

Analyte	EE1 (control well)	EE2	EE3	EE4	EE5	EE6	EE7	EE8	JUB (control well)	JUB1	JUB2	JUB3	JUB4
Aluminum	69.0	31.0U	31.0U	31.0	44.0	35.0	41.0	34.0	156.0	36.0	31.0U	31.0U	31.0U
Barium	71.0	70.0	138.0 J	70.0	61.0	70.0	65.0	74.0	62.0	60.0 J	73.0 J	70.0 J	71.0 J
Beryllium	0.3UJ	0.5UJ	0.2UJ	0.3UJ	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.2UJ	0.3UJ	0.2	0.3UJ	0.3UJ
Calcium	56900.0	65070.0	93710.0	58660.0	57380.0	57340.0	57070.0	57030.0	56260.0	55000.0	58470.0	54770.0	61830.0
Chromium	11.0	6.0	6.0	9.0	9.0	13.0	8.0	8.0	8.0	8.0	6.0	6.0	8.0
Cobalt	6.8U	6.8U	6.8U	6.8U	6.8U	6.8U	6.8U	7.0	6.8U	6.8U	8.0	6.8U	8.0
Iron	340.0 JF	173.0	11030.0 JF	150.0 J	131.0 J	315.0 JF	123.0 J	156.0 J	510.0JF	103.0	20.0 J	22.0 J	40.0 J
Magnesium	21910.0	21070.0 J	22990.0	21040.0	21790.0	21940.0	21700.0	21810.0	21870.0	20670.0	21370.0	20950.0	20990.0
Manganese	4.0	2.0	1144.0 F	2.0	2.0	2.0	1.0	2.0	7.0	4.0	1.0	1.0	4.0
Potassium	6688.0	8005.0	8649.0	7807.0	6737.0	6635.0	6667.0	6766.0	6391.0	7253.0	7408.0	6711.0	7122.0
Sodium	33960.0	33270.0	30920.0	34830.0	34630.0	34870.0	34850.0	3475D.0	34310.0	35070.0	35650.0	35140.0	34260.0
Vanadium	24.3	21.2	3.7	25.0	23.3	23.0	21.3	22.6	21.5	22.5	20.5	19.4	21.5

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

F - The concentration of this element exceeds the Secondary Drinking Water Standard listed in the current National Secondary Drinking Water Rules and Regulations.

TABLE 13

SUMMARY OF TOTAL INORGANIC ANALYTICAL RESULTS FOR
DRINKING WATER WELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Analyte	Water Supply Well (On-site)	Bonnie Brae	Buxbaum	Hommes	New Yenney	Old Yenney	Rada	Savage
Barium	71.0 J	56.0	73.0	78.0	85.0	81.0 J	99.0	108.0
Calcium	51970.0	67140.0	63830.0	63060.0	65140.0	53650.0	68710.0	77150.0
Chromium	6.0	9.0	9.0	9.0	8.0	4.0	9.0	9.0
Cobalt	6.8 U	8.0	8.0	6.8 U	6.8 U	7.0	9.0	8.0
Copper	5.9 U	5.9 U	5.9 U	14.0	15.0	32.0	5.9 U	6.0
Iron	25.0 J	166.0 J	195.0 J	139.0 J	398.0 JF	42.0 J	109.0 J	78.0 J
Magnesium	20750.0	22910.0	22780.0	18670.0	21940.0	21820.0	24210.0	25960.0
Manganese	2.0	2.0	3.0	7.0	4.0	5.0	2.0	2.0
Potassium	5593.0	8020.0	7508.0	5251.0	8122.0	7541.0	8341.0	9010.0
Sodium	32960.0	36350.0	37620.0	27170.0	37550.0	37760.0	39410.0	39880.0
Vanadium	18.4	21.6	22.6	12.4	21.9	17.1	20.3	19.2
Zinc	122.0	78.0	50.0	316.0	300.0	70.0	99.0	214.0

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

F - The concentration of this element exceeds the Secondary Drinking Water Standard listed in the current National Secondary Drinking Water Rules and Regulations.

TABLE 14

SUMMARY OF DISSOLVED INORGANIC ANALYTICAL RESULTS FOR
GROUND WATER MONITORING WELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Analyte	EE1 (control well)	EE2	EE3	EE4	EE5	EE8	EE7	EE8	JUB (control well)	JUB1	JUB2	JUB3	JUB4
Arsenic	9.0	4.0	1.0	7.0	1.0	5.0	8.0	6.0	7.0	5.0	7.0	1.0U	7.0
Cadmium	0.2	0.2U	0.2U	0.7	0.4	0.2U	0.2U	0.2U	0.5	0.2U	0.2U	0.8	0.2U
Chromium	1.0U	1.0U	3.0	1.0U	8.0	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U	1.0U
Copper	1.0	24.0	10.0	1.0U	1.0U	1.0U	1.0U	1.0U	1.0	41.0	10.0	9.0	10.0
Thallium	2.0	2.0	2.0	1.0	1.0	2.0	1.0	2.0	2.0	2.0	3.0	3.0	2.0
Nickel	8.0U	9.0	8.0U	5.0U	7.0	8.0U	5.0U	5.0U	8.0U	8.0U	5.0U	7.0	8.0U
Antimony	3.0	1.0	2.0	1.0U	1.0U	1.0U	1.0U	1.0U	1.0	1.0U	1.0	2.0	1.0U
Selenium	3.0	1.0	1.0	4.0	1.0	2.0	1.0U	1.0U	1.0U	1.0	2.0	2.0	1.0

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

TABLE 15

SUMMARY OF DISSOLVED INORGANIC ANALYTICAL RESULTS FOR
DRINKING WATER WELL SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Analyte	Water Supply Well (On-site)	Bonnie Brae	Buxbaum	Hommes	New Yenney	Old Yenney	Rada	Savage
Arsenic	4.0	5.0	6.0	2.0	6.0	1.0 U	8.0	1.0 U
Cadmium	0.2 U	0.2 U	0.2 U	0.3	0.6	0.2 U	0.2 U	0.6
Copper	10.0	3.0	1.0	10.0	1.0 U	40.0	5.0	1.0 U
Thallium	2.0	2.0	3.0	2.0	1.0	7.0	2.0	2.0
Nickel	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	7.0	5.0 U	5.0 U
Zinc	130.0	79.0	46.0	285.0	286.0	47.0	130.0	227.0
Selenium	1.0	3.0	2.0	2.0	1.0	1.0	1.0	1.0 U

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

4.4.5.3 Chromium Analyses

The Savage and Sons' drinking water well sample was analyzed for total and hexavalent (dissolved fraction) chromium. This analysis was completed to confirm the presence of chromium detected previously in the 1986 EPA investigation. Neither form of dissolved chromium was detected, at detection limits of 1.0 ug/l. This analysis does not confirm the 1986 EPA result, where 50 ug/l were found in the Savage drinking water sample.

4.5 QA/QC Review

Quality assurance review memoranda regarding inorganic and organic data are presented in Appendix C. All data addressed in the above discussions were considered acceptable for use.

Organic analyses of all ground water, drinking water, transport blank, laboratory blank, and rinsate samples, indicated the presence of methylene chloride and acetone. These two solvents are common laboratory solvents and thus may indicate laboratory contamination. Neither were found in the rinsate samples, indicating that the pump decontamination procedure prevented cross-contamination between samples. No other volatiles, semivolatiles, pesticides/PCBs, or TICs were detected in the transport blanks.

Total inorganics results for transport blank and rinsates samples are listed in Appendix C, Table C-1, while those for dissolved inorganics are in Appendix C, Table C-2. The results do not indicate greater levels of either total or dissolved inorganics in the rinsate samples compared to the transport blanks, indicating again the adequacy of the pump decontamination procedure.

5.0 SUMMARY AND CONCLUSIONS

The current investigation was initiated to confirm the ground water gradient underlying the site; to characterize contamination in ground water monitoring and drinking water wells; and to confirm presence of chromium in one domestic well (Savage and Sons). Toward these goals, E&E performed an on-site ground water elevation survey, and sampled 13 on-site monitoring wells, an on-site water supply well, and seven off-site domestic wells.

Water table measurements confirm that the general ground water flow direction beneath the site is towards the southwest. It appears, however, that localized use of water from the water supply and irrigation wells on-site may be contributing to a distortion of the water table near well JUB3. An anomalous water level measurement at well EE9 is likely due to siltation of the well.

Volatile organic compounds were detected in two on-site monitoring wells. This data confirms an environmental release of volatile organics to ground water. As discussed previously, the compounds detected are constituents of paint and varnish intermediates, paint removers, and dry cleaning fluids. Concentrations of volatile organics have increased In EE3, but have decreased in EE2 and JUB2 since 1985, suggesting that pumpage from the water supply well may be impacting contaminant migration in the ground water.

Volatile organics were detected only in one drinking water sample, the Bonnie Brae well. The levels detected are not considered a health threat. The source of this contamination is unknown.

Semi-volatile analyses revealed four compounds (1,2-dichlorobenzene, 2-methylphenol, isophorone, and napthalene) in ground water monitoring well EE3. Semi-volatile analyses for all other on-site wells were below quantitation limits. One compound, phenol, was found in the Savage drinking water well. No other semi-volatiles were detected in any domestic well samples. No pesticides/PCBs were detected in on- or off-site wells.

Inorganics concentrations in ground water and drinking water were highly variable, and did not show a distribution or trend consistent with the observed ground water flow. In the sample from EE3, levels of iron and manganese above background were detected, indicating a contaminant release to ground water. Inorganic concentrations detected in samples from other on-site wells do not appear to be significantly above background at this time. Concentrations of total inorganics were not significantly different from the dissolved species. The concentration of total chromium detected in the Savage and Sons' drinking water well (9 ug/l) was below the Federal Drinking Water Standard (50 ug/l). Hexavalent (dissolved fraction) chromium was not detected.

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APPENDIX A

EPA TARGET COMPOUND LIST (TCL)

ANALYTICAL PROTOCOLS

The standardized organic analytical methods are based on Federal Register Methods 625 (B/N/A), 608 (pesticide), 624 (VOA), EPA Methods for Chemical Analysis of Water and Wastes (MCAWW), and Test Methods for Evaluating Solid Wastes (SW-846) modified for CLP use in the analysis of both water and soil samples.

TABLE A-1

ORGANICS ANALYSES

Volatile Compounds (VOA)	Contract Required Quantitation Limits * Low Concentration Water [a] (ug/l)	Low Concentration Soil/Sediment [b] (ug/kg)
1. Chloromethane	10	10
2. Bromomethane	10	10
3. Vinyl Chloride	10	10
4. Chloroethane	10	10
5. Methylene Chloride	5	5
6. Acetone	10	10
7. Carbon Disulfide	5	5
8. 1,1-Dichloroethene	5	5
9. 1,1-Dichloroethane	5	5
10. trans-1,2-Dichloroethene	5	5
11. Chloroform	5	5
12. 1,2-Dichloroethane	5	5
13. 2-Butanone	10	10
14. 1,1,1-Trichloroethane	5	5
15. Carbon Tetrachloride	5	5
16. Vinyl Acetate	10	10
17. Bromodichloromethane	5	5
18. 1,2-Dichloropropane	5	5
19. trans-1,3-Dichloropropene	5	5
20. Trichloroethene	5	5
21. Dibromochloromethane	5	5
22. 1,1,2-Trichloroethane	5	5
23. Benzene	5	5
24. cis-1,3-Dichloropropene	5	5
25. 2-Chloroethylvinylether	10	10
26. Bromoform	5	5
27. 2-Hexanone	10	10
28. 4-Methyl-2-Pentanone	10	10
29. Tetrachloroethene	5	5
30. 1,1,2,2-Tetrachloroethane	5	5
31. Toluene	5	5
32. Chlorobenzene	5	5
33. Ethyl Benzene	5	5
34. Styrene	5	5
35. Total Xylenes	5	5

TABLE A-1 (CONT.)

Semivolatile Organic Compounds (BNA)	Contract Required Quantitation Limits * Low Concentration Water [c] (ug/l)	Low Concentration Soil/Sediment [d] (ug/kg)
1. Phenol	10	330
2. bis(-2-Chloroethyl)Ether	10	330
3. 2-Chlorophenol	10	330
4. 1,3-Dichlorobenzene	10	330
5. 1,4-Dichlorobenzene	10	330
6. Benzyl Alcohol	10	330
7. 1,2-Dichlorobenzene	10	330
8. 2-Methylphenol	10	330
9. bis(2-Chloroisopropyl)Ether	10	330
10. 4-Methylphenol	10	330
11. N-Nitroso-Di-n-propylamine	10	330
12. Hexachloroethane	10	330
13. Nitrobenzene	10	330
14. Isophorone	10	330
15. 2-Nitrophenol	10	330
16. 2,4-Dimethylphenol	10	330
17. Benzoic Acid	50	1600
18. bis(2-Chloroethoxy)Methane	10	330
19. 2,4-Dichlorophenol	10	330
20. 1,2,4-Trichlorobenzene	10	330
21. Naphthalene	10	330
22. 4-Chloroanaline	10	330
23. Hexachlorobutadiene	10	330
24. 4-Chloro-3-Methylphenol	10	330
25. 2-Methylnaphthalene	10	330
26. Hexachlorocyclopentadiene	10	330
27. 2,4,6-Trichlorophenol	10	330
28. 2,4,5-Trichlorophenol	50	1600
29. 2-Chloronaphthalene	10	330
30. 2-Nitroanaline	50	1600
31. Dimethyl Phthalate	10	330
32. Acenaphthylene	10	330
33. 3-Nitroaniline	50	1600
34. Acenaphthene	10	330
35. 2,4-Dinitrophenol	50	1600

TABLE A-1 (CONT.)

Semivolatile Organic Compounds (BNA)		Contract Required Quantitation Limits * Low Concentration Water [c] (ug/l)	Low Concentration Soil/Sediment [d] (ug/kg)
36.	4-Nitrophenol	50	1600
37.	Dibenzofuran	10	330
38.	2,4-Dinitrotoluene	10	330
39.	2,6-Dinitrotoluene	10	330
40.	Diethylphthalate	10	330
41.	4-Chlorophenyl-phenylether	10	330
42.	Fluorene	10	330
43.	4-Nitroaniline	50	1600
44.	4,6-Dinitro-2-Methylphenol	50	1600
45.	N-Nitrosodiphenylamine	10	330
46.	4-Bromophenyl-phenylether	10	330
47.	Hexachlorobenzene	10	330
48.	Pentachlorophenol	50	1600
49.	Phenathrene	10	330
50.	Anthracene	10	330
51.	Di-n-Butylphthalate	10	330
52.	Fluoranthene	10	330
53.	Pyrene	10	330
54.	Butylbenzylphthalate	10	330
55.	3,3'-Dichlorobenzidine	20	660
56.	Benzo(a)Anthracene	10	330
57.	bis(2-Ethylhexyl)Phthalate	10	330
58.	Chrysene	10	330
59.	Di-n-Octyl Phthalate	10	330
60.	Benzo(b)Fluoranthene	10	330
61.	Benzo(k)Fluoranthene	10	330
62.	Benzo(a)Pyrene	10	330
63.	Indeno(1,2,3-cd)Pyrene	10	330
64.	Dibenz(a,h)Anthracene	10	330
65.	Benzo(g,h,i)Perylene	10	330

TABLE A-1 (CONT.)

Pesticide / PCB Compounds	Contract Required Quantitation Limits * Low Concentration Water[a] (ug/l)	Low Concentration Soil/Sediment[b] (ug/kg)
1. Alpha-BHC	.05	8
2. Beta-BHC	.05	8
3. Delta-BHC	.05	8
4. Gamma-BHC (Lindane)	.05	8
5. Heptachlor	.05	8
6. Aldrin	.05	8
7. Heptachlor Epoxide	.05	8
8. Endosulfan I	.05	8
9. Dieldrin	.1	16
10. 4,4'-DDE	.1	16
11. Endrin	.1	16
12. Endosulfan II	.1	16
13. 4,4'-DDD	.1	16
14. Endosulfan Sulfate	.1	16
15. 4,4'-DDT	.1	16
16. Methoxychlor	.5	80
17. Endrin Ketone	.1	16
18. Chlordane	.5	80
19. Toxaphene	1.0	160
20. AROCLOR-1016	.5	80
21. AROCLOR-1221	.5	80
22. AROCLOR-1232	.5	80
23. AROCLOR-1242	.5	80
24. AROCLOR-1248	.5	80
25. AROCLOR-1254	1.0	160
26. AROCLOR-1260	1.0	160

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

a Medium Water Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 100 times the Individual Low Water CRQL.

b Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 100 times the Individual Low Soil/Sediment CRQL.

TABLE A-1 (CONT.)

c Medium Water Contract Required Quantitation Limits (CRQL) for Semivolatile TCL Compounds are 100 times the individual Low Water (CRQL).

d Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Semivolatile TCL Compounds are 60 times the individual Low Soil/Sediment (CRQL).

e Medium Water Contract Required Quantitation Limits (CRQL) for Pesticide/PCB TCL Compounds are 100 times the individual Low Water (CRQL).

f Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Pesticide/PCB TCL Compounds are 60 times the individual Low Soil/Sediment (CRQL).

TABLE A-2

INORGANIC ANALYSES

Element	Contract Required Quantitation Limits * Low Concentration Water (ug/l)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	5
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

* Specific detection limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

APPENDIX B

SAMPLE DOCUMENTATION SUMMARY

SAMPLE TRACKING REPORT
Ecology and Environment, Inc.
Seattle, Washington
Contract No.: 68-01-7347

SITE NAME	TDO NUMBER	CASE NUMBER	EPA SAMPLE NUMBER	LAB NUMBER	STORET NUMBER	SAMPLE DESCRIPTION	SAMPLE DATE	DATE SHIPPED	AIRBILL NUMBER	SAMPLE MATRIX	CONC	PRES	ANALYSES REQUESTED	LABORA
PSL	8701-04	6973	87124550	N/A	102151	EE1	03/17/87	03/18/87	1072083174	WATER	LOW	NONE	INORG/F	EPA X
SL	8701-04	6973	87124551	N/A	102190	JUECONTROL	03/17/87	03/18/87	1072083174	WATER	LOW	NONE	INORG/F	EPA X
SL	8701-04	6973	871E455E	N/A	102184	EE4	03/17/87	03/18/87	1072083174	WATER	LOW	NONE	INORG/F	EPA X
PSL	8701-04	6973	87124571	N/A	N/A	MB1	03/18/87	03/18/87	1072083174	WATER	LOW	NONE	INORG/F	EPA X
SL	8701-04	E973	87124575	N/A	N/A	MB2	03/18/87	03/18/87	1072083174	WATER	LOW	NONE	INORG/F	EPA X
PSL	8701-04	6973	87124576	N/A	N/A	MBS	03/18/87	03/18/87	1072083174	WATER	LOW	NONE	INORG/F	EPA X
SL	8701-04	6973	87124554	N/A	102200	SAVAGE	03/18/87	03/18/87	1072083174	WATER	LOW	NONE	CR3,CR6	EPA X
SL	8701-04	6973	87124551	JC 303	102190	JUECONTRL	03/17/87	03/18/87	1072083152	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124552	JC 305	102184	EE4	03/17/87	03/18/87	1072083152	WATER	LOW	NONE	BNA/VOA	GSRI
SL	8701-04	6973	87124550	JC 304	102181	EE1	03/17/87	03/18/87	1072083152	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124555	JC 308	102198	HOMES	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
SL	8701-04	6973	87124556	JC 310	102196	6 BASE	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124553	JC 313	102201	NEW YENNY	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124554	JC 307	102200	SAVAGE	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
SL	8701-04	6973	87124557	JC 311	102197	BOX BAUM	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124558	JC 312	102195	RADA	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
SL	8701-04	6973	87124560	JC 314	102188	EE8	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124563	JC 317	102188	EE8	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124573	JC 326	N/A	BLE	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
SL	8701-04	6973	87124574	JC 325	N/A	TP1	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124561	JC 315	N/A	R1	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
SL	8701-04	6973	87124572	JC 324	N/A	BL1	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124553	JC 308	102185	EE5	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI
PSL	8701-04	6973	87124562	JC 316	102187	EE7	03/18/87	03/19/87	1072083185	WATER	LOW	NONE	BNA/VOA	GSRI

SAMPLE TRACKING REPORT
Ecology are Environment, Inc.
Seattle, Washington
Contract No.: 68-01-7347

SITE NAME	TDD NUMBER	CASE NUMBER	EPA SAMPLE NUMBER	LAB NUMBER	STORET NUMBER	SAMPLE DESCRIPTION	SAMPLE DATE	DATE SHIPPED	AIRBILL NUMBER	SAMPLE MATRIX	CONC	PRES	ANALYSES REQUESTED	LABORA
PSL	8701-04	6373	87124576	MJ 2601	N/A	MB3	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/MN	CAL
SL	6701-04	6373	87124556	MJ 2627	10Z136	B BRAE	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/MN	CAL
SL	6701-04	6373	87124557	MJ 2628	10Z137	BUX BAUM	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/MN	CAL
PSL	6701-04	6373	87124558	MJ 2629	10Z135	RADA	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/ON	CAL
SL	6701-04	6373	87124553	MJ 2630	10Z201	NEW YENNY	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
PSL	6701-04	6373	87124571	MJ 6699	N/A	MB-1	03/16/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
SL	6701-04	6373	87124575	MJ 6900	N/A	MB2	03/16/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
SL	6701-04	6373	87124561	MJ 2632	N/A	R1	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
PSL	6701-04	6373	87124562	MJ 2633	10Z187	EE7	03/13/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
SL	6701-04	6373	87124563	MJ 2634	10Z186	EE6	03/16/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
PSL	8701-04	6373	87124559	MJ 2624	10Z185	EE5	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
SL	6701-04	6373	87124560	MJ 2631	10Z166	EE6	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
PSL	6701-04	6373	87124554	MJ 2625	10Z200	SAVAGE	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
PSL	6701-04	6373	87124555	MJ 2626	10Z196	HOMMES	03/18/87	03/13/87	1072083200	WATER	LOW	NONE	INORG/UN	CAL
SL	8701-04	6373	87124560	N/A	10Z186	EE6	03/16/87	03/13/87	1072083443	WATER	LOW	NONE	INORG/F	EPA X
PSL	6701-04	6373	87124537	N/A	10Z200	SAVAGE	03/16/87	03/13/87	1072083443	WATER	LOW	NONE	INORG/F	EPA X
SL	6701-04	6373	87124555	N/A	10Z196	HOMMES	03/16/87	03/13/87	1072083443	WATER	LOW	NONE	INORG/F	EPA X
PSL	6701-04	6373	87124576	N/A	N/A	MB3	03/16/87	03/13/87	1172083443	WATER	LOW	NONE	INORG/F	EPA X
PSL	6701-04	6373	87124556	N/A	10Z136	S BRAE	03/18/87	03/13/87	1172083443	WATER	LOW	NONE	INORG/F	EPA X
SL	6701-04	6373	87124557	N/A	10Z137	BUX BAUM	03/16/87	03/13/87	1172083443	WATER	LOW	NONE	INORG/F	EPA X
PSL	8701-04	6373	87124558	N/A	10Z135	RADA	03/18/87	03/13/87	1172083443	WATER	LOW	NONE	INORG/F	EPA X
SL	6701-04	6373	87124553	N/A	10Z201	NEW YENNY	03/16/87	03/13/87	1172083443	WATER	LOW	NONE	INORG/F	EPA X
PSL	6701-04	6373	87124571	N/A	N/A	MB1	03/16/87	03/13/87	1172083443	WATER	LOW	NONE	INORG/F	EPA X
PSL	6701-04	6373	87124561	N/A	N/A	R1	03/18/87	03/13/87	1172083443	WATER	LOW	NONE	INORG/F	EPA X

SAMPLE TRACKING REPORT
Ecology and Environment, Inc.
Seattle, Washington
Contract No.: 68-01-7347

SITE NAME	TDD NUMBER	CASE NUMBER	EPA SAMPLE NUMBER	LAB NUMBER	STORET NUMBER	SAMPLE DESCRIPTION	SAMPLE DATE	DATE SHIPPED	AIRBILL NUMBER	SAMPLE MATRIX	CONC	PRES	ANALYSES REQUESTED	LABOR
PSL	3701-04	6373	67124562	N/A	102187	EE7	03/18/87	03/19/87	1172089443	WATER	LOW	NONE	INORG/F	EPA X
SL	6701-04	6373	87124563	N/A	102186	EE6	03/16/87	03/13/87	1172089443	WATER	LOW	NONE	INORG/F	EPA X
SL	8701-04	6373	67124553	N/A	102185	EE5	03/16/87	03/19/87	1172089443	WATER	LOW	NONE	INORG/F	EPA X
PSL	6701-04	6373	67124552	MJ 2623	102184	EE4	03/17/87	03/19/87	1072083165	WATER	LOW	NONE	INORG/LN	CAL
SL	6701-04	6373	87124550	MJ 2621	102181	EE1	03/17/87	03/19/37	1072083163	WATER	LOW	NONE	INORG/LN	CAL
PSL	6701-04	6373	67124551	MJ 2622	102190	JUBCONTROL	03/17/87	03/19/87	1072083163	WATER	LOW	NONE	INORG/LN	CAL
SL	6701-04	6373	67124565	JC 323	102180	MS WELL	03/19/87	03/20/37	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
PSL	6701-04	6373	67124576	JC 327	102192	JUB-2	03/13/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
PSL	6701-04	6373	67124579	JC 328	102183	EE5	03/19/87	03/20/37	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
SL	6701-04	6373	67124564	JC 316	102202	OLD YENNY	03/19/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
PSL	6701-04	6373	67124566	JC 322	102193	JUB-3	03/19/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
SL	6701-04	6373	67124566	JC 320	N/A	TUB 6	03/19/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
PSL	6701-04	6373	67124565	JC 319	N/A	T2	03/19/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
PSL	6701-04	6373	67124567	JC 321	102194	JUB-4	03/19/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
SL	3701-04	6373	87124561	JC 331	N/A	TP-2	03/20/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
PSL	6701-04	6373	67124570	JC 305	102191	JUB-1	03/19/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
SL	6701-04	6373	67124560	JC 330	102182	EE2	03/19/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
PSL	6701-04	6373	67124575	N/A	102183	EE3	03/19/87	03/20/87	1072083410	WATER	LOW	NONE	BNA/VOA	EERI
PSL	6701-04	6373	67124570	N/A	102191	JUB-1	03/19/87	03/20/87	1072083432	WATER	LOW	NONE	INORG/F	EPA X
SL	6701-04	6373	67124560	N/A	102182	EE2	03/19/87	03/20/87	1072083432	WATER	LOW	NONE	INORG/F	EPA X
PSL	6701-04	6373	87124564	N/A	102202	OLD YENNY	03/20/87	03/20/87	1072083432	WATER	LOW	NONE	INORG/F	EPA X
SL	6701-04	6375	67124577	N/A	N/A	MB-4	03/19/87	03/20/87	1072083432	WATER	LOW	NONE	INORG/F	EPA X
PSL	8701-04	6373	87124568	N/A	102193	JUB-3	03/19/87	03/20/87	1072083432	WATER	LOW	NONE	INORG/F	EPA X
PSL	8701-04	6373	87124569	N/A	102180	MS WELL	03/19/87	03/20/87	1072083432	WATER	LOW	NONE	INORG/F	EPA X

SAMPLE TRACKING REPORT
Ecology and Environment, Inc.
Seattle, Washington
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SITE NAME	TDD NUMBER	CASE NUMBER	EPA SAMPLE NUMBER	LAB NUMBER	STORET NUMBER	SAMPLE DESCRIPTION	SAMPLE DATE	DATE SHIPPED	AIRBILL NUMBER	SAMPLE MATRIX	CONC	PRES	ANALYSES REQUESTED	LABOR-
PSL	8701-04	6373	87124578	N/A	10Z192	JUB-2	03/19/87	03/20/87	1072069432	WATER	LOW	NONE	INORS/F	EPA X
SL	6701-04	6373	87124566	N/A	N/A	TUBE B	03/20/87	03/20/87	1072069432	WATER	LOW	NONE	INORS/F	EPA X
SL	8701-04	6373	87124565	N/A	N/A	R2	03/19/87	03/20/87	1072069432	WATER	LOW	NONE	INORS/F	EPA X
PSL	6701-04	6373	87124567	N/A	10Z194	JLB-4	03/19/87	03/20/87	1072069432	WATER	LOW	NONE	INORS/F	EPA X
SL	6701-04	6373	67124570	MJ 8836	10Z191	JUB-1	03/13/87	03/20/87	1072069421	WATER	LOW	NONE	INORS/UN	CAL
PSL	6701-04	6373	67124560	MJ 2610	10Z162	EE2	03/19/87	03/20/87	1072069421	WATER	LOW	NONE	INORG/UN	CAL
SL	6701-04	6373	87124564	MJ 2635	10Z202	OLD YEANY	03/20/87	03/20/87	1072069421	WATER	LOW	NONE	INORS/UN	CAL
SL	6701-04	6373	67124577	MJ 2607	N/A	MB-4	03/19/87	03/20/87	1072069421	WATER	LOW	NONE	INORS/UN	CAL
PSL	8701-04	6373	67124568	MJ 8836	10Z193	JUB-3	03/19/87	03/20/87	1072069421	WATER	LOW	NONE	INORS/UN	CAL
SL	6701-04	6373	67124563	MJ 8837	10Z160	WS WELL	03/19/87	03/20/87	1072069421	WATER	LOW	NONE	INORS/UN	CAL
PSL	6701-04	6373	87124573	MJ 2606	10Z192	JUB-2	03/19/87	03/20/87	1072069421	WATER	LOW	NONE	INORG/UN	CAL
SL	6701-04	6373	67124566	MJ 8634	N/A	TUBE B	03/19/87	03/20/87	1072069421	WATER	LOW	NONE	INORS/UN	CAL
SL	6701-04	6373	67124565	MJ 2636	N/A	R2	03/19/87	03/20/87	1072069421	WATER	LOW	NONE	INORG/UN	CAL
PSL	6701-04	6373	67124567	MJ 8636	10Z194	JLB-4	03/19/87	03/20/87	1072069421	WATER	LOW	NONE	INORS/UN	CAL
SL	3701-04	6373	67124575	MJ 2609	10Z133	EE3	03/19/87	03/20/87	1072069421	WATER	LOW	NONE	INORG/UN	CAL

APPENDIX C

QA/QC MEMORANDA

TABLE C-1

SUMMARY OF TOTAL INORGANIC ANALYTICAL RESULTS FOR
TRANSPORT BLANKS (TB) AND RINSATE (R) SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Analyte	TB1	TB2	TB3	TB4	R1	R2	R3
Aluminum	31.0 U	31.0 U	48.0 U	31.0 U	31.0 U	31.0 U	31.0 U
Barium	1.0	1.0 J	0.9 U	0.9 UJ	0.9 U	3.0 J	0.9 UJ
Beryllium	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.3 UJ	0.2 U
Calcium	47.0	24.0 U	99.0	24.0 U	82.0	1269.0	24.0 U
Chromium	4.0	3.7 U	3.7 U	3.7 U	3.7 U	4.0	3.7 U
Copper	5.9 U	5.9 U	15.0	5.9 U	5.9 U	5.9 U	5.9 U
Iron	78.0 J	132.0 J	1244.0 JF	19.0 J	155.0 J	44.0 J	16.0 J
Magnesium	40.0 U	40.0 U	56.0	40.0 U	40.0 U	498.0	40.0 U
Manganese	1.0	0.6 U	4.0	1.0	1.0	2.0	0.6 U
Sodium	113.0	165.0	214.0	259.0	96.0	1007.0	252.0
Zinc	10.0 UJ	26.0	23.0	1.3 U	5.0 UJ	7.0 UJ	2.0 UJ

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or the reported value is less than the contract required detection limit (CRDL).

F - The concentration of this element exceeds either the Primary or Secondard Drinking Water Standard listed in the Current National Primary Drinking Water Rules and Regulations.

TABLE C-2

SUMMARY OF DISSOLVED INORGANIC ANALYTICAL RESULTS FOR
TRANSPORT BLANKS (TB) AND RINSATE (R) SAMPLES
PASCO SANITARY LANDFILL, PASCO, WASHINGTON
MARCH 1987
(ug/l)

Analyte	TB1	TB2	TB3	TB4	R1	R2	R3
Arsenic	1.0	5.0	2.0	1.0 U	2.0	1.0 U	2.0
Cadmium	0.3	0.2	0.3	0.2 U	0.2 U	0.3	0.2 U
Chromium	1.0 U	3.0	1.0 U	1.0 U	1.0 U	3.0	1.0 U
Copper	1.0 U	1.0 U	1.0 U	22.0	1.0 U	9.0	10.0
Thallium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0	1.0 U
Nickel	15.0	5.0 U	5.0 U	8.0	5.0 U	5.0 U	5.0 U
Antimony	1.0 U	1.0 U	1.0 U	1.0 U	2.0	1.0 U	1.0 U
Selenium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0

U - The material was analyzed for, but was not detected. The associated numerical value is the laboratory's reported sample quantitation limit.

ecology and environment, inc.

101 YESLER WAY, SEATTLE, WASHINGTON, 98104, TEL. 206/624-9637

International Specialists in the Environment

MEMORANDUM

DATE: June 8, 1987

TO: John Osborn, FIT-RPO, USEPA, Region X

FOR: Joyce Crosson, RSCC, USEPA, Region X

THRU: David Buecker, FIT-OM, E&E, Seattle

FROM: James Herndon, Chemist, E&E, Seattle
Andrew Hafferty, Senior Chemist, E&E, Seattle

SUBJ: QA of Case 6973 (HSL Organics)
Pasco Landfill

REF: F10-8703-01

CC: Gerald Muth, DPO, USEPA, Region X
Marcia Knadle, ESD-PO, USEPA, Region X
Deborah Flood, HWD-SM, USEPA, Region X
Jeffrey Villnow, E&E, Seattle

The Quality Assurance review of 28 samples, Case 6973, collected from Pasco Landfill, has been completed. The 28 water samples were analyzed at low level for TCL organics by Gulf South Research Institute, of New Orleans, Louisiana the samples were numbered:

JC-303	JC-310	JC-317	JC-324
JC-304	JC-311	JC-318	JC-325
JC-305	JC-312	JC-319	JC-326
JC-306	JC-313	JC-320	JC-327
JC-307	JC-314	JC-321	JC-328
JC-308	JC-315	JC-322	JC-330
JC-309	JC-316	JC-323	JC-331

Sample JC-324 and JC-326 were analyzed for Acid/Base/Neutrals and Pesticides/PCBs only. Samples JC-325 and JC-331 were analyzed for volatiles only. Data Qualifications

The following comments refer to the laboratory performance In meeting the Quality Assurance - Quality Control Specifications outlined In Exhibit E of IFB WA 85-J-176.

1) Timeliness - Acceptable

2) Instrument Tuning - Acceptable

a) The DFTPP spectra for 3/30/87 run on Instrument 8 (Finn 2) flagged 7 low intensity masses as saturated.

b) All BFB spectra (3/20/87 to 3/25/87) run on Instrument A (Finn 1) had masses flagged as saturated. The number of masses flagged varied between 14 and 78 per spectra.

The affect on data quality Is not known, but concern is expressed with this occurrence.

3) initial Calibration - Acceptable

4) Continuing Calibration

The ABN standard SS032987B (3/29/87) was out of control for the CCC Pentachlorophenol.

	%RSD	QC Limit
Pentachlorophenol	33.IS	25%

The ABN standard SS033087A (3/30/87) was out of control for the CCC Dinoctylphthalate.

	SRSD	QC Limit
Dinoctylphthalate	25.7S	25%

Volatile samples analyzed on 3/20/87 were run after an initial calibration. Sample quantitation is referanced against a 50 ppb standard In the raw data. No Form VII (Continuing Calibration) was supplied to referance the 50 ppb standard used against the initial calibration. It is assumed that the 50 ppb standard from the initial calibration was used to quantitate Blank 1, JC-303, JC-304 and JC-305.

The VOA standard VS032487B (3/24/87) was out of control for the CCCs Vinyl Chloride and 1,2-Dlchloropropane.

	%RSD	QC Limit
Vinyl Chloride	28.I%	25%
1,2-Dlchloropropane	26.2S	25%

The VOA standard VS032587A (3/25/87) was out of control for the CCC Vinyl Chloride.

	%RSD	QC Limit
Vinyl Chloride	25.4%	25%

5) Pesticide/PCB Standards

The laboratory resubmitted the Pesticide Evaluation Standards Summary covering the following samples:

JC-304	JC-318	JC-322
JC-305	JC-319	JC-324
JC-309	JC-320	JC-326
JC-317	JC-321	

a) Linearity - Acceptable

b) DDT Retention Time - Acceptable

c) Retention Time Windows - Acceptable

d) Analytical Sequence - Acceptable

e) 4,4'-DDT/Endrin Degradation - Acceptable

f) Dibutylchloroendate Retention Time Shift - Acceptable

g) Standards - Acceptable

6) Instrument Detection Limits - Acceptable

7) Blanks

ABN - Acceptable

There was some confusion concerning the two blanks shown as extracted on the 3/20/87 extractions logs. Only one blank was analyzed for that days extractions. It was difficult to correlate between the blank names on the extraction log and the rest of the data.

The laboratory resubmitted the semivolatile OADs forms for Blank 4 and Blank 5 to reflect corrected detection lialts.

Volatiles

Blank VB032087B (Blank 1 - 3/20/87) contained Methylene Chloride (common solvent) at a level greater than 5 time the CRDL.

	sample	CRDL
Methylene Chloride	36 ppb	5 ppb

Pesticides/PCBs - Acceptable

8) Surrogate Recovery

ABN - Acceptable

Volatiles - Acceptable

Pesticides/PCB - Acceptable

9) Matrix Spike - Matrix Spike Duplicate

ABN

Spike recoveries on sample JC-316 were above advisory limits for Pyrene and 2,4-Dinitrotoluene.

	% Recovery	Limit
Pyrene (MS)	138%	26 - 127%
Pyrene (MSD)	148%	26 - 127%
2,4-Dinitrotoluene (MSD)	98%	24 -96%

Spike recoveries on sample JC-322 were above advisory limits for Pyrene, 2,4-Dinitrotoluene and Phenol.

	% Recovery	Limit
Pyrene (MS)	140%	26 - 127%
Pyrene (MSD)	136%	26 - 127%
2,4-Dinitrotoluene (MS)	100%	24 -96%
Phenol (MS)	91%	12 - 89%
Phenol.(MSD)	91%	12 - 89%

Volatiles - Acceptable

Pesticide/PCB

The Relative Percent Difference for spike recoveries on sample JC-316 were above advisory limits for Heptachlor.

	% RPD	Limit
Heptachlor	24%	20%

The Relative Percent Difference for spike recoveries on sample JC-322 were above advisory limits for all spiking compounds.

	% RPD	Limit
Lindane	57%	15%
Heptachlor	57%	20%
Aldrin	72%	22%
Dieldrin	57%	18%
Endrin	57%	21%
4,4'-DDT	62%	27%

10) Sample Analysis

All ABN results were flagged "J" (estimated) and detection limits flagged "UJ" (undetected, estimated quantitation limit) for samples JC-316 and JC-322 due to out of limits recoveries for spiking compounds Pyrene and 2,4-Dinitrotoluene.

Reported values for 2-Methylphenol, Isophorone and naphthalene were flagged "M" (presumptive identification). Masses greater than 10% relative intensity existing the sample spectra are not accounted for in the confirmation spectra.

Acetone results for the blanks and samples listed below were flagged "J" (estimated value) due to a RPD greater than 25% in the continuing calibration standards.

Blank 3	JC-314	JC-318	JC-322
Blank 4	JC-315	JC-319	JC-325
JC-309	JC-316	JC-320	
JC-313	JC-317	JC-321	

Methylene Chloride results for samples JC-303, JC-304 and JC-305 Were flagged "UJ"(undetected, estimated quantitation limit) where sample concentrations were less than 10 times the amount found in the blank (36ppb * 10 = 360 ppb).

The Acetone result sample JC-319 was flagged "J" (estimated). The value reported was below CRDL.

The Methylene Chloride result in sample JC-319 was flagged "J" (estimated) The raw quantitation value (the value before accounting for dilution) was 50% higher than the highest standard, and therefore outside of the established linear range. A second dilution run was not made.

Methylene Chloride and Benzene results for sample JC-328 were flagged "J" (estimated). The raw quantitation values (the values before accounting for dilution) were below the CRDL for those compounds.

The "B" flag was removed from the Tentatively Identified Compound (TIC) report (Form 1, Part B) for the volatiles samples listed below. The compound listed as "Unknown" at or near scan 290 was not quantitated on the blank sample TIC report.

JC-310	JC-313	JC-315	JC-324
JC-311	JC-314	JC-317	JC-326

The laboratory resubmitted volatile OADs forms for samples JC-319 and JC-328 to reflect higher detection limits for diluted samples.

Pesticide/PCB results for sample JC-322 were flagged "J" (estimated) and detection limits flagged "UJ" (undetected, estimated quantitation limit) due to out of limit RPDs for all spiking compounds.

Data Use

The usefulness of the data is based on the criteria in the "Laboratory Data Validation Functional Guidelines for Evaluating Organics (R-582-4-5-01) and Pesticides/PCB (R-582-55-01)".

Upon consideration of the data qualifications noted above, the ABN, Volatile and Pesticide/PCB data are ACCEPTABLE for use except where flagged with data qualifiers that modify the usefulness of the individual values.

Data Qualifiers

U - The material was analyzed for, but was not detected. The associated numerical value is an estimated sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or concentrations reported were less than the CRQL.

R - Quality Control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.

Q - No analytical result.

N - Presumptive evidence of presence of material (tentative identification).

B - The compound was found in the laboratory blank as well as the sample.

M - Mass spectral criteria for positive identification were not met. However, in the opinion of the laboratory, the identification is correct based on the analyst's professional judgement.

F - Concentration of this compound exceeds either the primary or secondary drinking water standard listed in the Safe Drinking Water Act of 1974.

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International Specialists in the Environment

MEMORANDUM

DATE: May 4, 1987

TO: John Osborn, FIT-RPO, USEPA, Region X

FOR: Joyce Crosson, RSCC, USEPA, Region X

THRU: David Buecker, FIT-OM, E&E, Seattle

FROM: Thomas Cammarata, Geochemist, E&E, Seattle
Andrew Hafferty, Senior Chemist, E&E, Seattle

SUBJ: QA of Case 6973 (Inorganics)
Pasco Landfill

REF: F10-8703-01

CC: Gerald Muth, DPO, USEPA, Region X
Ken Kitchingman, DPO, USEPA, Region IX
Marcia Knadle, ESO-PO, USEPA, Region X
Deborah Flood, HWD-SM, USEPA, Region X
Jeff Vilinow, E&E, Seattle

The Quality Assurance review of 28 samples, Case 6973, collected from Pasco Landfill, has been completed. Twenty-eight water samples were analyzed at low level for Inorganics by California Analytical Laboratory, Sacramento, California. The samples were numbered:

MJ 2601	MJ 2625	MJ 2634
MJ 2607	MJ 2626	MJ 2635
MJ 2608	MJ 2627	MJ 2636
MJ 2609	MJ 2628	MJ 8900
MJ 2610	MJ 2629	MJ 8894
MJ 2621	MJ 2630	MJ 8895
MJ 2622	MJ 2631	MJ 8896
MJ 2623	MJ 2632	MJ 8897
MJ 2624	MJ 2633	MJ 8898
		MJ 8899

Data Qualifications

The following comments refer to the laboratory performance In meeting the Quality Control specifications outlined in IFB WA 85-J-838.

1) Timeliness - Acceptable

2) Initial Calibration - Acceptable

3) Continuing Calibration - Acceptable

4) Instrument Detection Limits - Acceptable

5) Blanks - Acceptable

6) ICP Interference Check - Acceptable

7) Laboratory Control Sample

Laboratory control sample was outside MSA control limits.

Element	%R	QC Limits
Arsenic*	89%	85 - 115%

*Sample analyzed by MSA -- correlation coefficient less than the CRQL of .995.

8) Duplicate Sample Analysis

Two duplicates were outside control limits.

Sample	Element	RPD	Control Limits
MJ 2601	Iron	48%	20%
MJ 2610	Iron	54%	20%

9) Spiked Sample Analysis

Two duplicates were outside control limits.

Sample	Element	% Recovery	Control Limits
MJ 2601	Iron	50%	75 - 125%
MJ 2610	Thallium	82%	85 - 115%

*Sample analyzed by MSA -- correlation coefficient less than the CRQL of .995.

10) ICP Serial Dilution

One duplicate was outside control limits.

Sample	Element	% Difference	Control Limits
MJ 2610	Barium	16%	10%

11) Furnace AA - Acceptable

12) Mercury Analysis - Acceptable

13) Sample Analysis - Acceptable

Data Use

The usefulness of the data is based on the criteria outlined In the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (R-582-5-5-01).

Upon consideration of the above comments, the data is ACCEPTABLE for use except where flagged with data qualifiers which modify the usefulness of Individual values.

Additional data packages associated with the project are expected for CLP labs.

Data Qualifiers

U - The material was analyzed for, but was not detected. The associated numerical value is an estimated sample quantitation limit.

J - The associated numerical value is an estimated quantity because quality control criteria were not met or concentrations reported were less than the CRQL.

R - Quality tontrol indicatos that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verifl-cation.

Q - No analytical result.

N - Presumptiva evidence of presence of material (tentative identifica-tion).

B - The element was found in the laboratory blank as well as the sample.

M - Mass spectral criteria for positive identification were not met. However, in toe opinion of the laboratory, the identification is cor-rect based on the analyst's professional judgement.

F - Concentration of this element exceeds either the primary or secondary drinking water standard listed in the Safe Drinking Water Act of 1974.

QA6973.INO

TC/ng